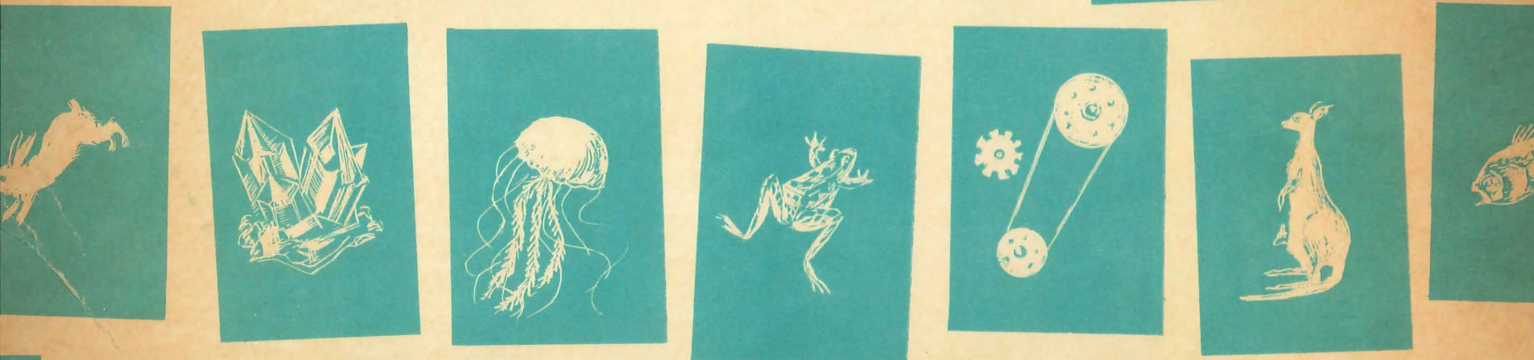
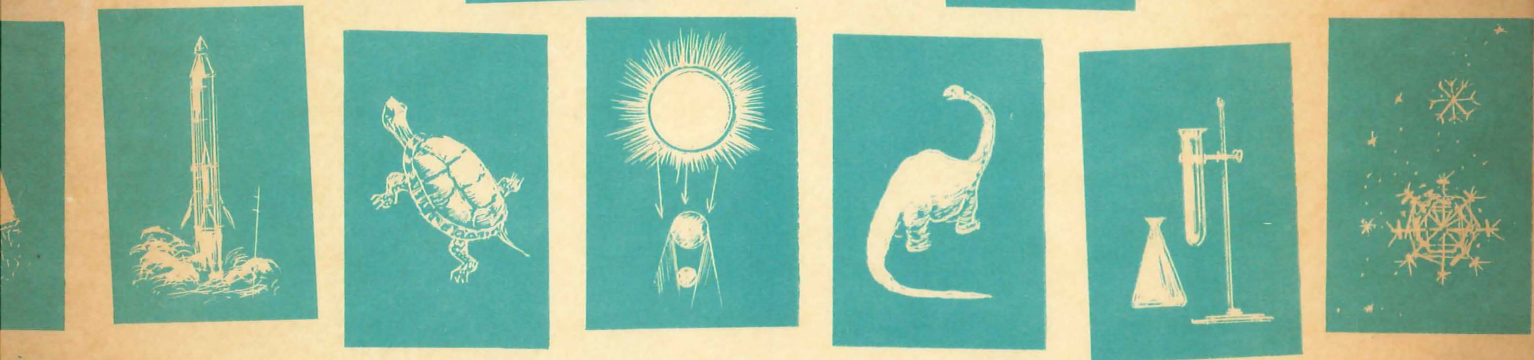
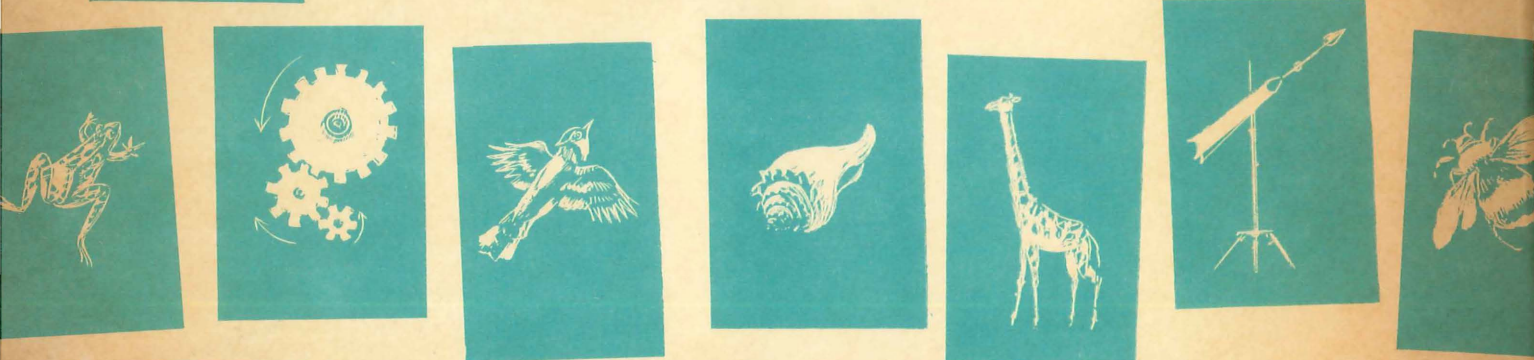
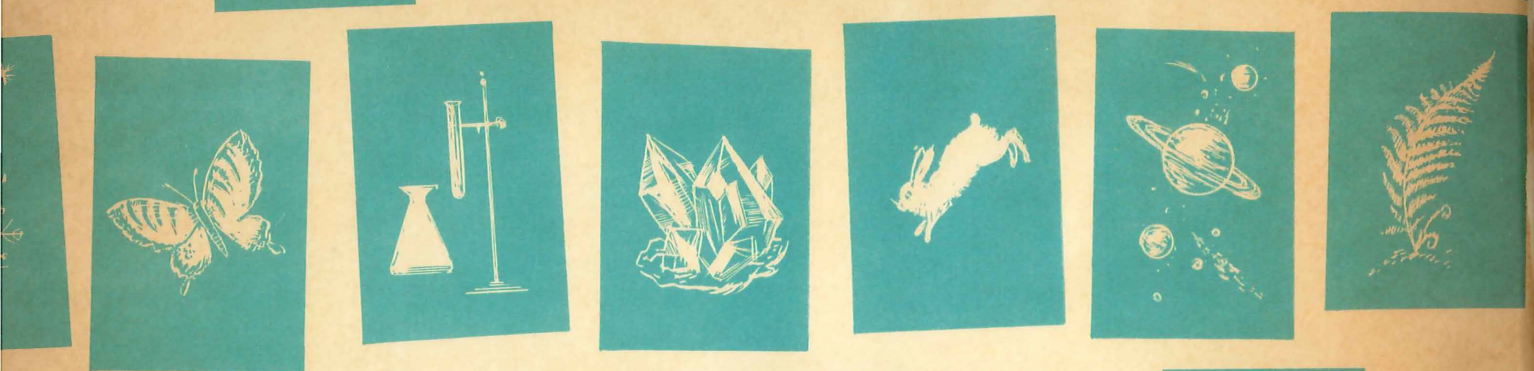
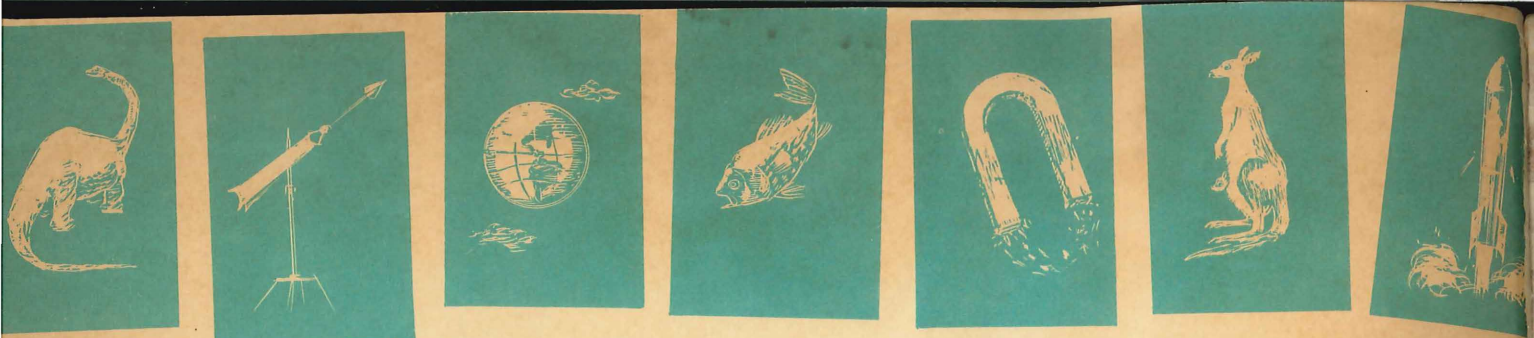


The
**HOW
AND
WHY**
Wonder Book of

THE POLAR REGIONS



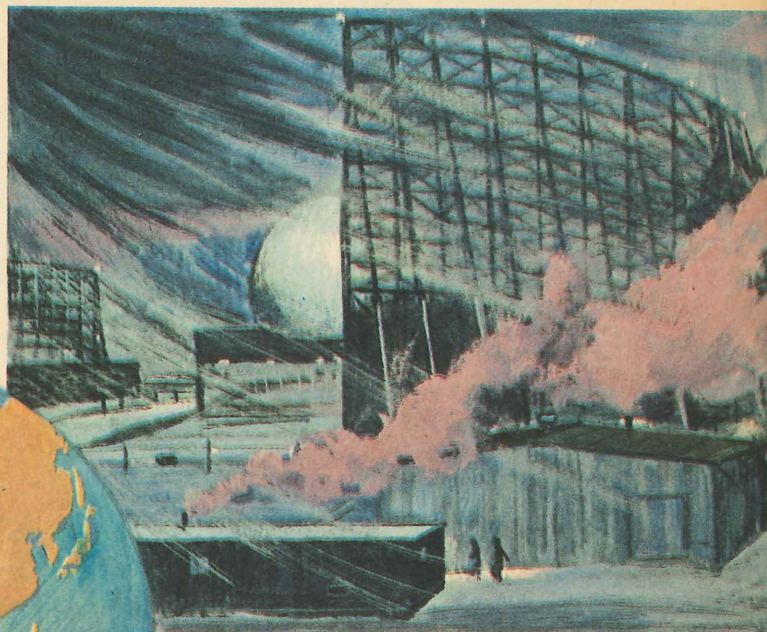
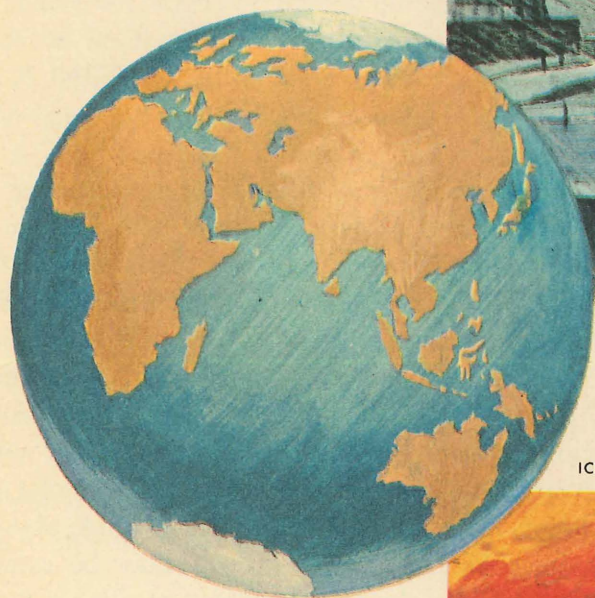


THE HOW AND WHY WONDER BOOK OF THE POLAR REGIONS

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U. S. POLAR DEFENSE, THULE

ICE-BREAKER TRAPPED IN POLAR ICE NEAR LITTLE AMERICA



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Introduction

Explorers and scientists have always been fascinated by the Polar Regions. For centuries, they have probed the waters and the lands, seeking short cuts between the continents. Some sought to reach the Poles; others, to untap their mysteries. As this *How and Why Wonder Book of the Polar Regions* unfolds, the efforts of explorers and scientists of the past have amassed a rich heritage of knowledge about the Arctic and Antarctic Regions.

The reasons for the extreme cold; how animals and plants live in such barren areas; the astonishing chain of interdependence between plants, animals, and man — all make a vivid story. Also, the life of the Eskimo, completely attuned to Polar conditions, illustrates the amazing ability of mankind to adapt to his environment. The stories of the brave men who have explored these desolate lands attests to the heroic nature of men.

Many new reasons prompt scientists and explorers to find out even more about these icy regions. For example, current experiments with long-range weather forecasting require more information about the Polar icecaps. New air routes over the Poles make it necessary to know more about living in cold climates so that suitable emergency stations may be established. Also, this information is needed by the people who are attracted in ever-increasing numbers to the Polar Regions by the discovery of valuable mineral resources.

So it is no surprise that the author writes, "Man is exposing to the light of science the secrets of the once remote and forbidding ends of Earth." This *How and Why Wonder Book of the Polar Regions* is a useful introduction to what we already know and sets the stage for better understanding of all the future Polar achievements we can expect.

Paul E. Blackwood

Dr. Blackwood is a professional employee in the U. S. Office of Education. This book was edited by him in his private capacity and no official support or endorsement by the Office of Education is intended or should be inferred.

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The Very Ends of the Earth

Today, one of the dreams of mankind is to explore the other planets in our solar system. But another dream, still small and quiet, is that one day, perhaps hundreds of years from now, explorers will visit the planets of far distant suns — suns so distant that they

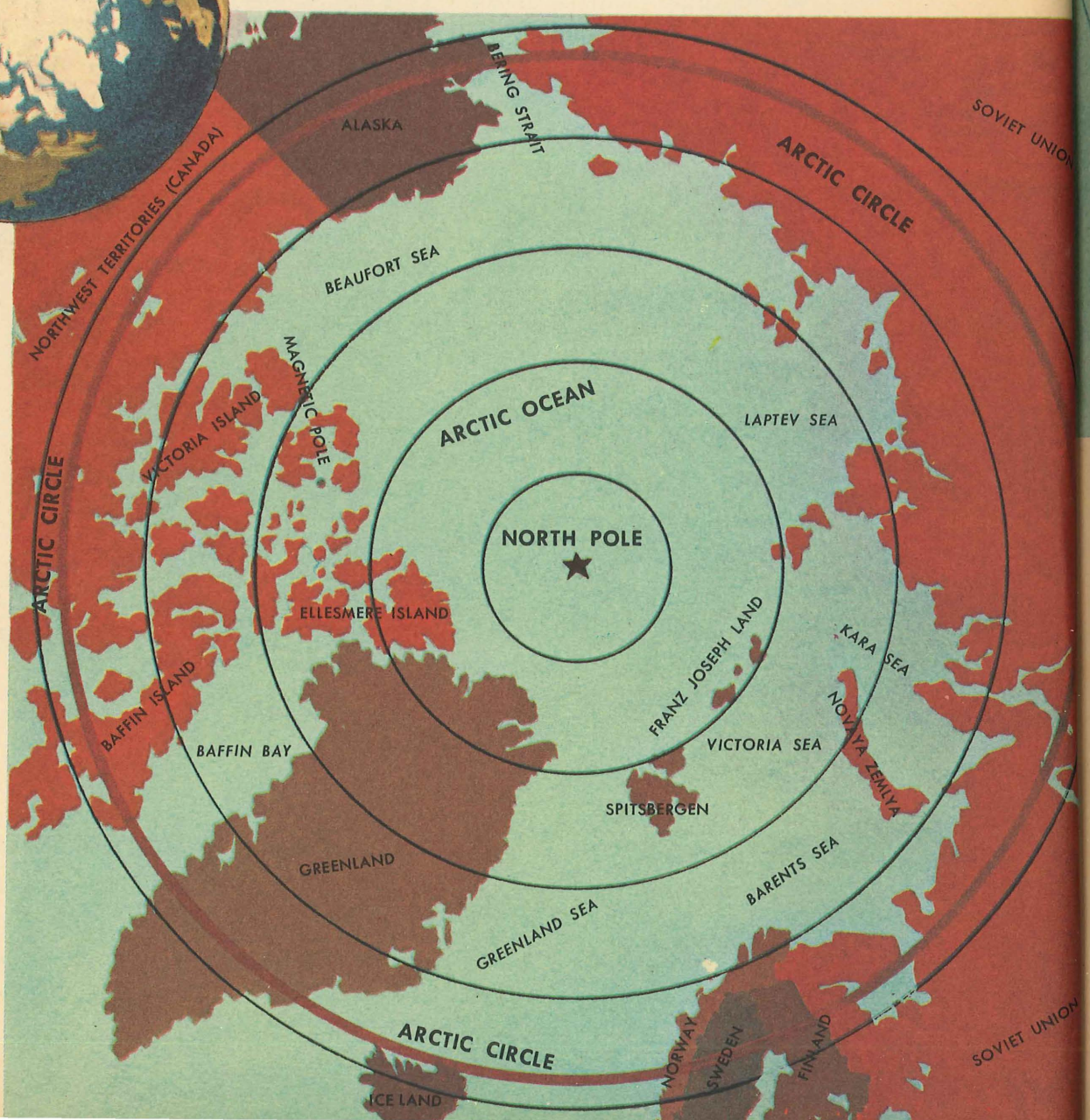
appear only as tiny shining dots in even our most powerful telescopes.

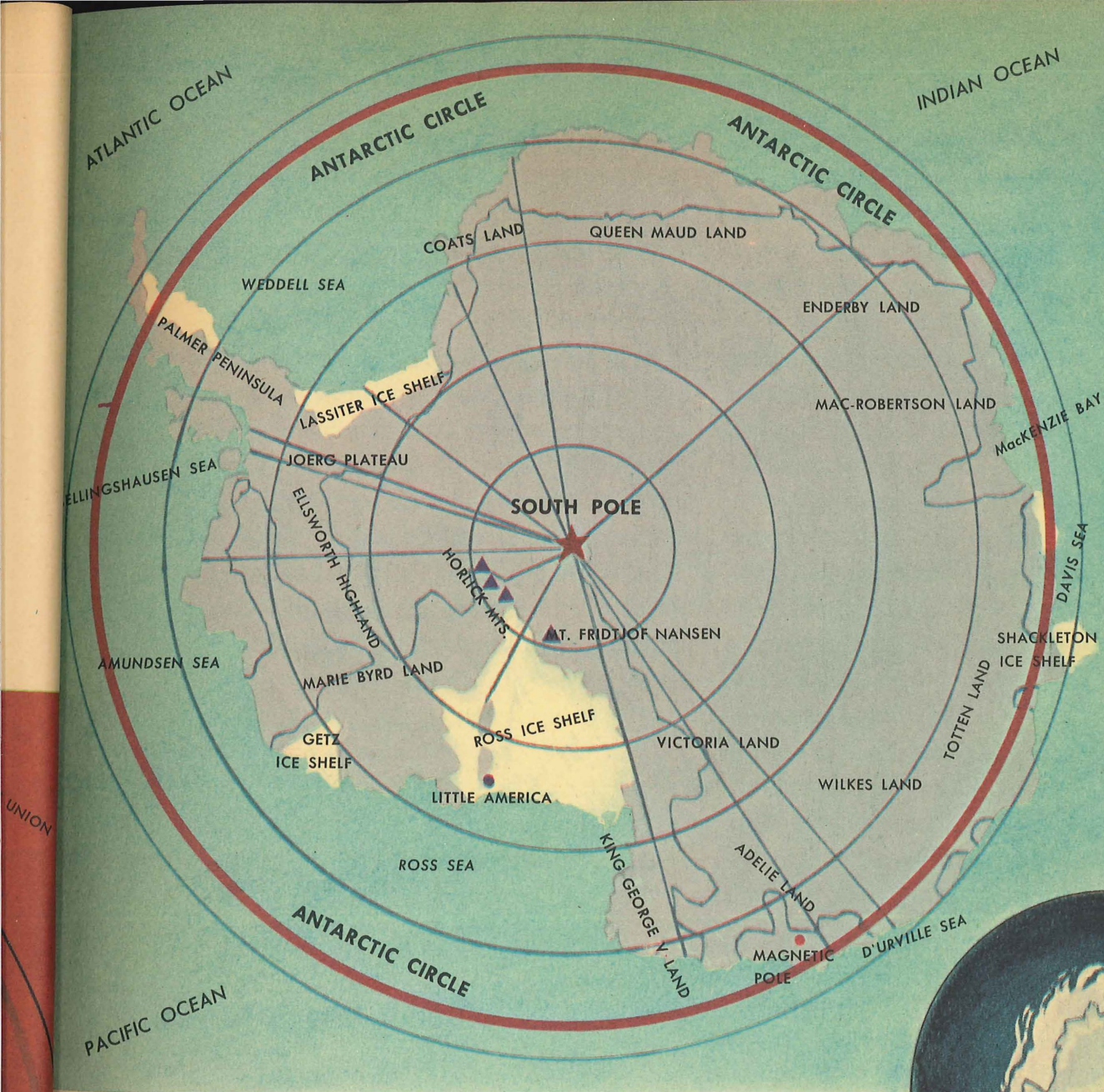
Perhaps, one of those remote planets is, like ours, the home of intelligent life. Let us suppose also that they dream the same dream, and choose our solar system for a visit from one of their explor-



NORTH POLAR REGIONS:

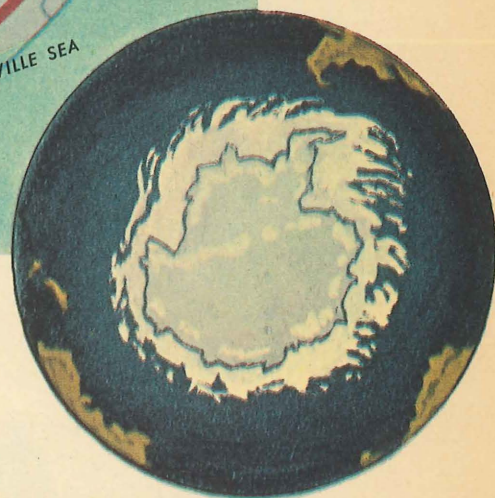
The Arctic Circle, $66\frac{1}{2}$ degrees north latitude, crosses land at many points. Parts of Alaska, parts of Canada's Northwest Territories, most of Greenland, parts of Scandinavia, and parts of Siberia all lie within the Arctic Region. So do a number of smaller islands.





SOUTH POLAR REGIONS

The Antarctic Circle, $66\frac{1}{2}$ degrees south latitude, runs mainly across open sea, barely touching the land mass of Antarctica at just a few points. The names of the bodies of water and the land masses of Antarctica are mementos of their famous explorers and discoverers.



ers. When this traveler arrives from the immense reaches of space, he will pass lonely Pluto, icy Neptune, quiet Uranus, the turbulent giants, Jupiter and Saturn, and after drifting by barren Mars, he will finally see a blue-green planet slowly turning in space while it follows its exact course around the blazing sun. As he nears the orbit of this planet, he

will notice that it is rotating smoothly, as though an imaginary axle ran through it from top to bottom.

As the traveler comes closer, he will be able to observe details — immense oceans, large and irregularly shaped land masses, drifting clouds, and green vegetation. He will be looking at our home, the Earth, a beautiful planet,

richly endowed with natural resources and a wide range of climate. But our visitor will be struck by the two great, almost-blindingly white icecaps centered around the ends of the axis that contain the North and South Poles.

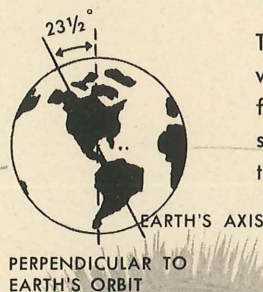
To us, they are the very ends of the Earth — the last areas of the globe to be explored and mapped; the most inhospitable parts of the planet; a devastation of wind, snow, and temperatures approaching the icy cold of space. We call them the Polar Regions.

The Polar Regions are bounded geographically by imaginary circles — the Arctic Circle in the North and the Antarctic Circle in the South. The circles are placed at $66\frac{1}{2}$ degrees away from the Equator, which runs around the center of the Earth. Therefore, the Arctic Circle is also known as $66\frac{1}{2}$

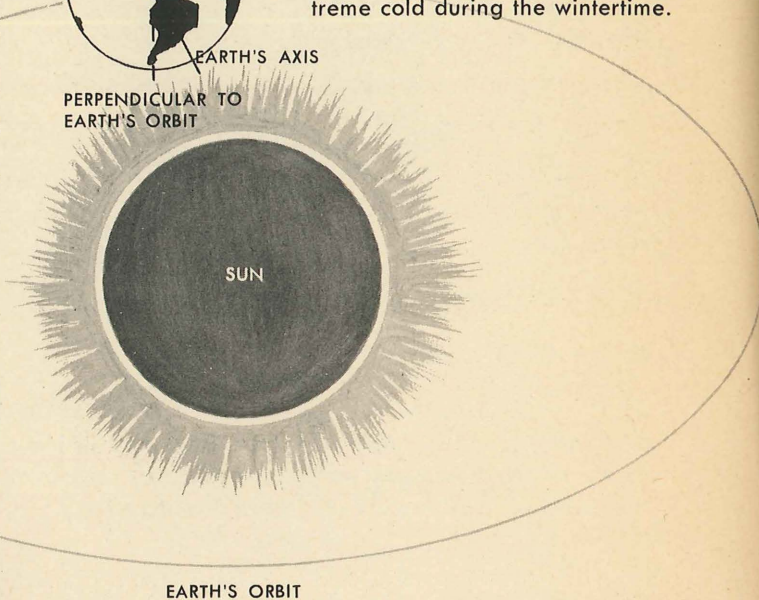
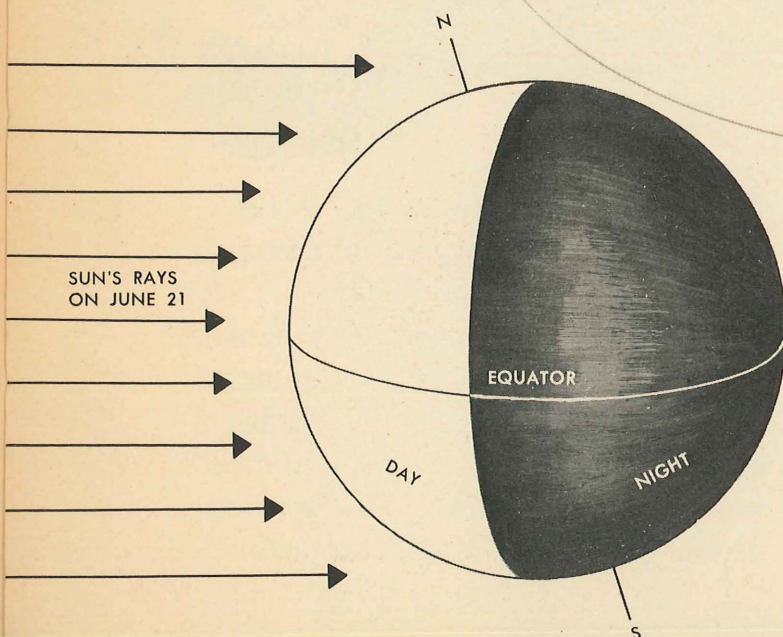
What are the boundaries of the Polar Regions?

degrees north latitude and the Antarctic Circle as $66\frac{1}{2}$ degrees south latitude.

The line of the Antarctic Circle runs mainly across open sea, barely touching the land mass of Antarctica at just a few points, while the line of the Arctic Circle crosses land at many places. It runs through Alaska, the upper portion of Canada's Northwest Territories, encompasses most of Greenland, slices through Norway, Sweden, Finland, and completes its circuit by passing through Russia and a long strip of Siberia. Within the circle are several island groups surrounded by the Arctic Ocean.



The earth's axis is tilted $23\frac{1}{2}$ degrees which makes the angle of the sunlight falling on the Polar Regions even more shallow, another reason for the extreme cold during the wintertime.



In the central section of the earth (as illustrated at left), the sunlight blazes down at almost a right angle; at the Poles, the angle is shallow. This is one of the two reasons for the difference in temperature between the tropics and the Polar Regions. The other is the tilt of the earth which, together with its rotation on its axis, also accounts for the 24 hours of daylight in the North Pole and 24 hours of darkness at the South Pole on June 21. At the other end of the orbit, on December 21, this situation is reversed.

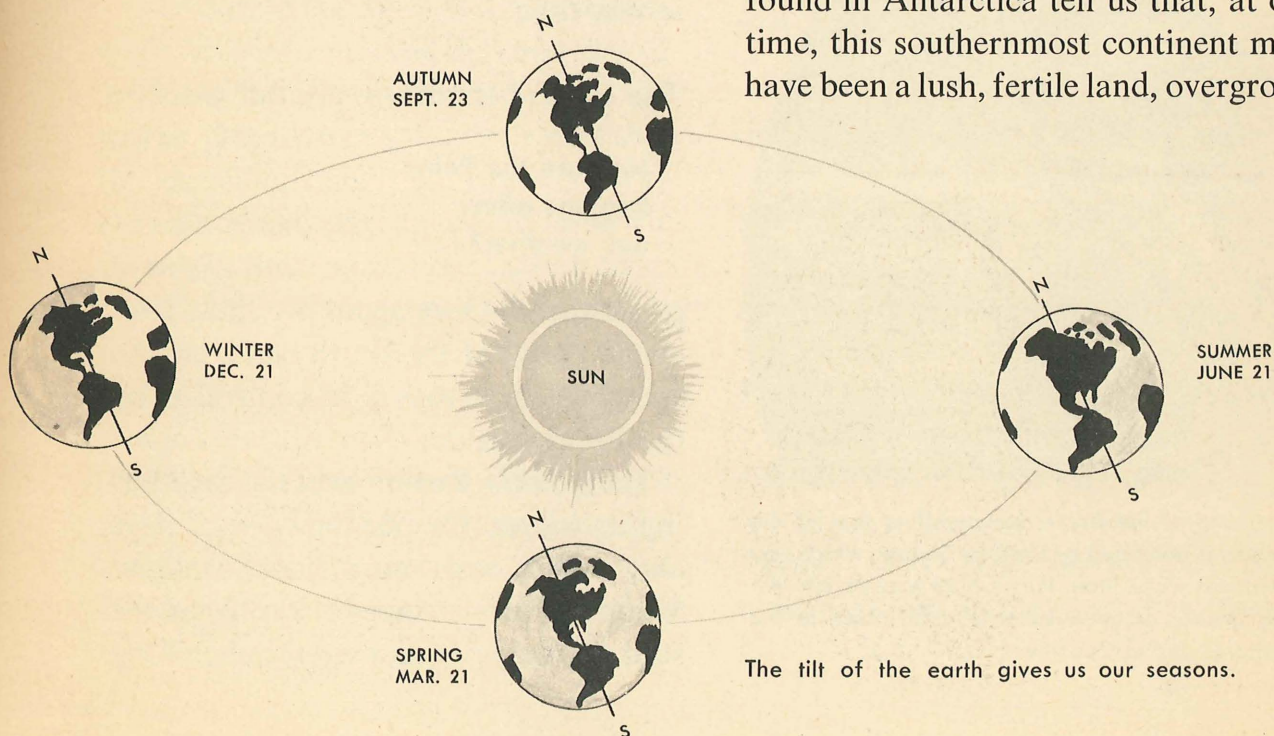
The Earth is blanketed with a layer of atmosphere through which the sun's rays must pass before its surface can be warmed. In the central section of the Earth, the sunlight blazes fiercely down on the tropics at almost a right angle. But at the Poles, the life-giving rays strike the surface in a shallow angle, and must penetrate a greater depth of air. This weakens their intensity, and is one of the two reasons for the frigid climate of the Polar Regions.

If our visitor from interstellar space is observant, he will notice that the axis about which the Earth rotates is not exactly vertical in relation to the sun, but slightly tipped. The planet leans at an angle of $23\frac{1}{2}$ degrees. This $23\frac{1}{2}$ -degree tilt of the Earth's axis is the other reason for the intense cold of the Polar Regions. It makes the angle of the entering sunlight even more shallow during the wintertime of each Pole.

During the year-round orbit of the Earth, there is a period when the North Pole leans away from the sun and experiences winter. At the same time, the South Pole leans towards the sun and experiences "summer." At the opposite end of the orbit, this situation is reversed, and so are the seasons. Therefore, the tilt of the Earth gives us our seasons since the angle toward the sun of any given area is changing constantly and regularly. Interestingly enough, the distance from the sun has no bearing on the temperature of the season. The winter in the Northern Hemisphere occurs when the Earth is closest to the sun, but with that area leaning away from the rays.

There have been periods in the long history of the Earth when the angle of tilt was different and it was possible for sunlight to fall more directly on a temperate Arctic and Antarctica. Coal deposits thirteen feet thick found in Antarctica tell us that, at one time, this southernmost continent must have been a lush, fertile land, overgrown

Were the Poles always cold?

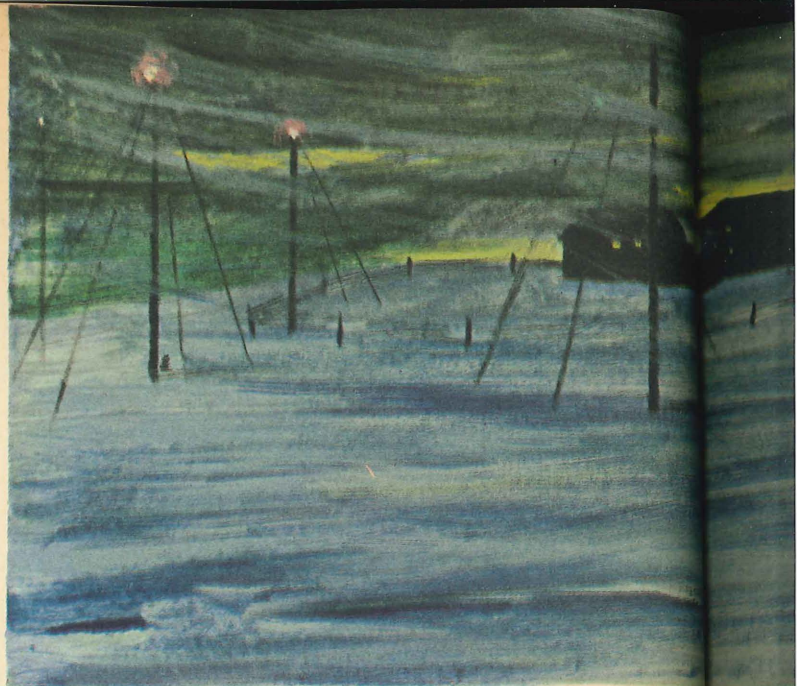


The tilt of the earth gives us our seasons.

Polar weather stations, like the one shown, help our weather men to make long-range predictions.

with plant life. But since the tilt of the Earth has been changing gradually, a bitter ice age descended upon the continent, freezing it solid. How long this condition will remain can be only a guess since the change in tilt cannot be measured, even during a lifetime. However, scientists predict that, in the far future, the icy regions may once again enjoy a temperate climate. This could also result in drastic changes elsewhere on the earth with some continents becoming colder and others warmer.

There is a new theory, recently published by three Australian scientists, which speaks of "continental drift." These men believe that the continents of the Earth were not always in their



familiar places, but drifted gradually across the planet's surface. Since the Earth is believed to consist of a solid crust which floats on a liquid core, it is reasonable to suppose that sections of the crust could possibly move from place to place. If so, then Antarctica was in a temperate zone at one time before slowly drifting into the region of deep freeze.

Whatever the circumstances, it is definitely certain that the areas now centered around the Poles were warm at one time.

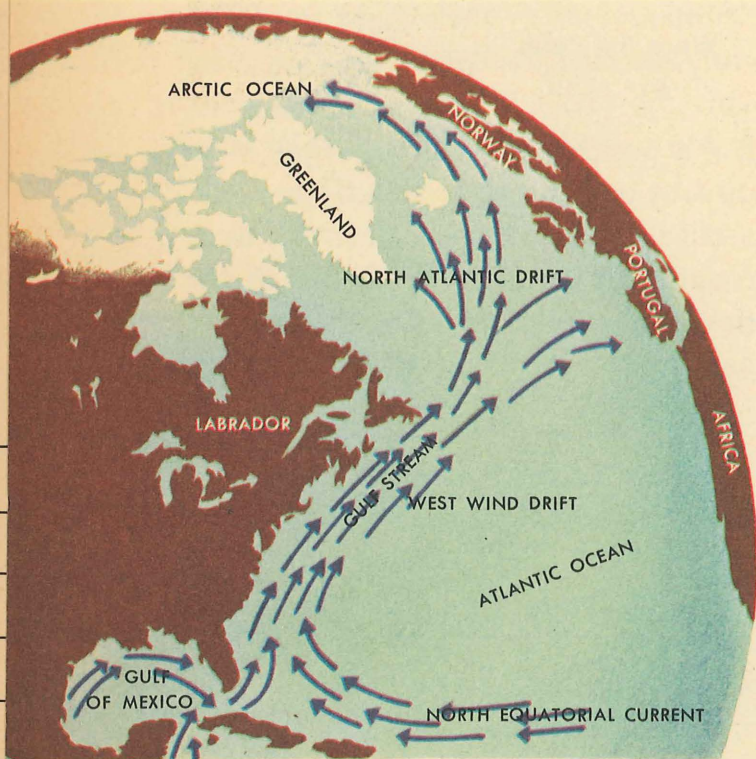
The ends of the Earth are our weather

How do the Polar Regions affect our weather?


factories, and their influence on the lands nearer the center is very

pronounced. Once again, we must look at the tilting of the Earth on its axis to see why our weather is controlled by the Polar Regions.

Each Polar Region experiences, during its winter, the phenomenon of days and weeks with only little sunlight. When a Pole is tipped away from the sun, the angle is so extreme that little



The climate of the Arctic, compared to that of the Antarctic, is tempered by the Gulf Stream, which carries warmer water from the Gulf of Mexico into the Arctic Ocean. At the same time, this influences the air currents and our weather.



light ever reaches the area. The nights are long, and they get longer as midwinter approaches. Each day, the sun appears for a shorter time and finally, on midwinter day, the sun does not appear at all. Then, day by day, it pokes briefly above the horizon only to disappear again, plunging the Polar wastes into darkness once more. But each day, the sun rises a bit higher, stays a little longer, until midsummer day when the phenomenon of the Midnight Sun appears — a twenty-four hour day!

But during the long, desolate winter, when little heat reaches the snow-tossed wastes, a bitter cold descends upon the region. Day after day, the little heat that the air and ground hold radiates away into space. It is as though an immense funnel is sucking the heat away from the Earth. The moisture in the air crystallizes into icy flakes, a bitter wind howls in the desolation, and all living things brace themselves against the might of a Polar winter. The cold is almost unbelievably intense. In the Arctic Zone, a record temperature of 90 degrees below zero was recorded, but the Antarctic holds the world rec-



Releasing weather balloons in the cold Polar air is one of the many daily outdoor activities of our weather men in the Polar Regions.

ord. There, Soviet scientists measured a temperature of 126.9 degrees below zero!

When air is that cold, it becomes more dense and heavier and like a flood, begins to flow away from the Polar Regions. As these tidal waves of frigid air descend upon the neighboring continents, they bring with them winter's icy breath. They are known as "cold fronts," and push aside the warm masses of air as they move on relentlessly. Quite often, storms break out

along the way when cold front meets warm air mass. The moisture in the warm air is frozen to snow. During the summer, the warm air can move up from the tropics, but only because the Poles are not generating cold fronts. Therefore, the condition of the air at the Poles controls our weather.

Our weather men, or meteorologists, can now make long-range predictions from the temperature and movements of the Polar air masses. For this reason, Polar weather stations are most important to us in our daily lives. The men who work at these stations actually live in the midst of the planet's weather factories, and so can tell us what is being manufactured.

But summer does come to the Polar Regions, and it brings some changes. In the Arctic, temperatures may rise to 60 or 70 degrees above zero, and a great deal of ice and snow melts, exposing the ocean and large expanses of ground. In the Antarctic, the temperature never rises above the freezing point of 32 degrees Fahrenheit, even in the summer, but a day of bright sunlight may melt a little snow and allow a few rocks to stand out against the white landscape.

Interestingly enough, each is geologically different. Ant-

Can the Polar Regions be considered real continents?

arctica is a full-fledged land mass, equal in size to the United States and all of Europe combined, while most of the Arctic is only a frozen ocean. Antarctica is, therefore, considered a continent, but the Arctic is a zone, with the North Pole at its center.

This is one of the reasons for the difference in temperature between the two regions. Since a land mass cannot conserve heat as well as water can, Antarctica is much colder than the Arctic. In the North, the Arctic Ocean acts as a moderating influence, retaining the summer heat for a much longer time. In the South, the Polar snows remain intact during the summer, and their stark whiteness reflect the heat of the sun right back into space.

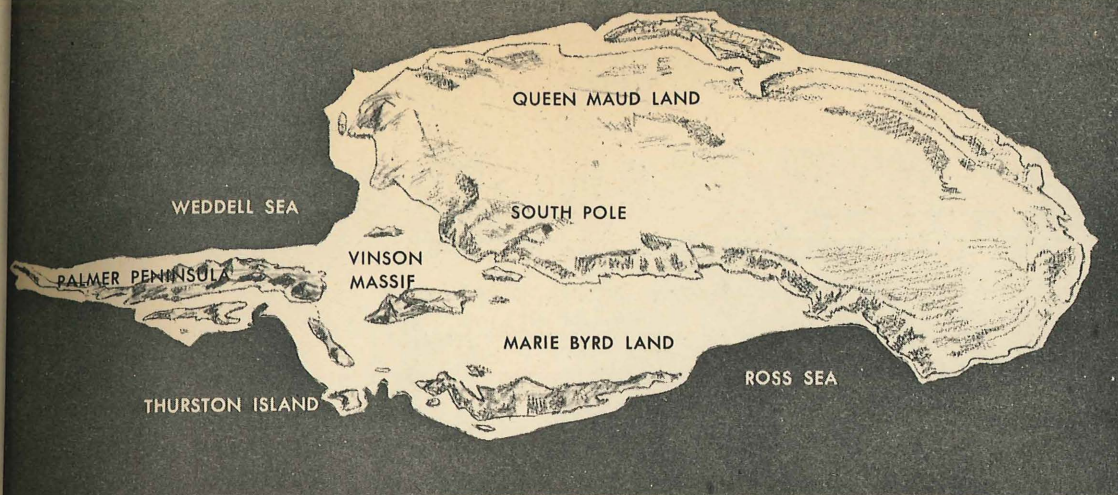
Antarctica, the South Polar continent,

What is the shape of Antarctica?

looks like a big cookie with several deep bites

taken out of it. It is roughly centered around the Pole, and its irregular shape contains a multitude of bays and harbors. Three of the world's major oceans meet at Antarctica, where they form a giant ocean encircling the continent. They are the Atlantic, the Pacific, and the Indian Oceans, and at the shores of the continent, are individual seas which have been named for some of the explorers who risked their lives at this end of the Earth. Amundsen, Bellingshausen, Ross, and Weddell are some of the names immortalized in the bodies of water that lap against the massive ice of the continent.

The interior, as well, has many places named after famous people. Mountains, plateaus, and ice shelves bear the names of their discoverers or of the sponsors who sent the expeditions. There is no other continent where the names of places so reflect the men who went to find them. Perhaps, this is because the exploration of Antarctica has been the



The Antarctic continent as it would appear if its ice sheet could be made to disappear. Measurements taken recently with special instruments indicate that much of what was thought to be "land" is actually "solid ice" frozen far below sea level. Our illustration shows Palmer Peninsula as a chain of islands.

most difficult task of its kind in the history of man.

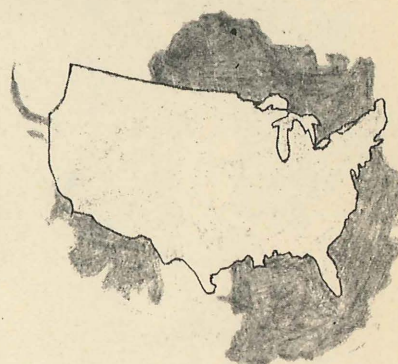
Since there is solid land under Antarc-

Are there natural resources in Antarctica?

tica's ice, it is believed that rich deposits of mineral and other resources

must lie deep below the ice. But before these deposits can be mined, some way must be found to withstand the weather. Warm, moist air from the tropical regions moves north over the continent during the winter, but is chilled immediately. The moisture settles out as a snow blizzard, while the winds develop hurricane force. Year after year, the ice and snow covering Antarctica thickens. The weight now bearing down on the land is increased by millions of tons. It erodes the mountains, buries research stations, and changes the day to day appearance of the continent.

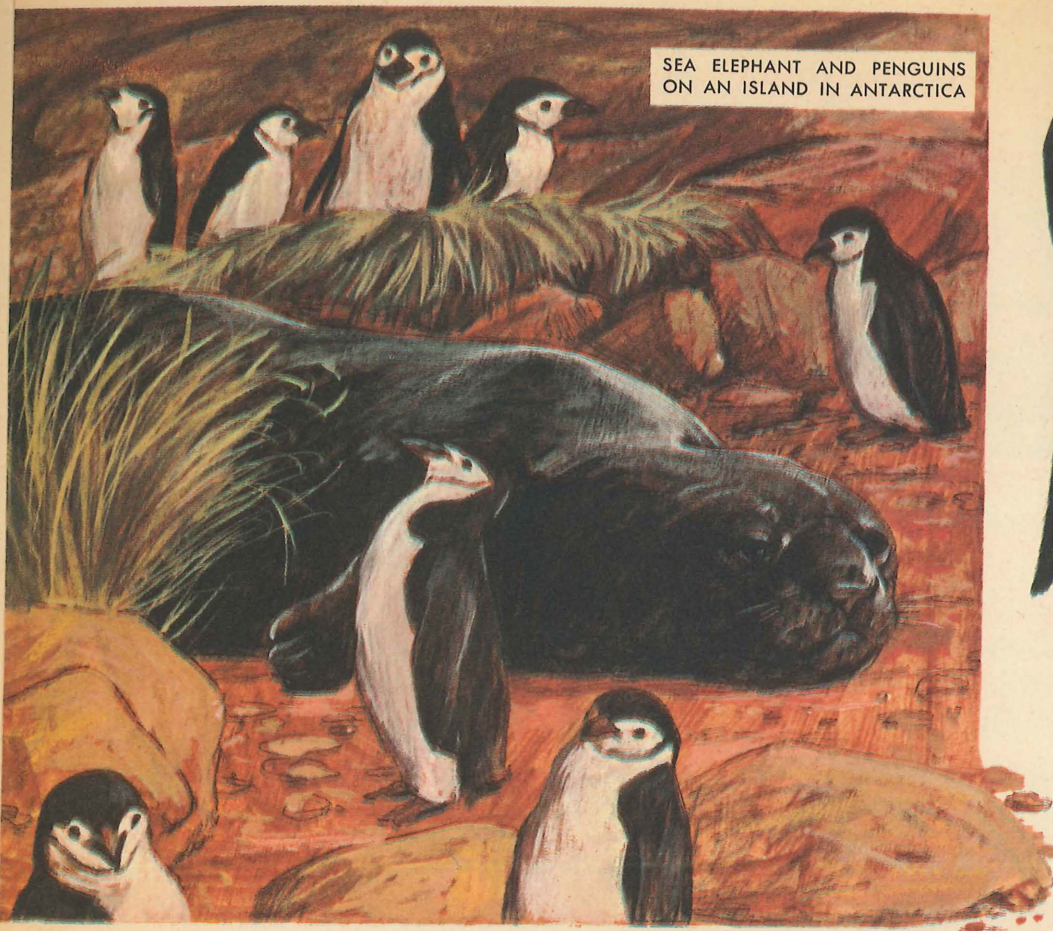
It is believed that the weight of the ice layer is so great that the land itself has been compressed below sea level. It has also been estimated that Antarctica contains some 90 per cent of all the ice and snow in the world! This is a tremendous amount to be concentrated in one relatively small area. Fortunately,



Comparative sizes of Antarctica and the United States of America.

this weight is roughly centered on the Polar axis, or the rotation of the planet might be affected, causing it to wobble like a top that is heavier at one end.

During a symposium in the summer of 1963, Dr. Charles R. Bentley, Professor and member of the University of Wisconsin's Geophysics and Polar Research Center, gave some data resulting from American and Russian findings during the International Geophysical Year. The mean fall of fresh snow is about one and a half feet over a total area of about 4,500,000 square miles; the mean temperature the year round is 67 degrees below zero Fahrenheit; the ice at the South Pole was found to be 9,000 feet thick; and the continent is covered by 22 quadrillion (22,000,000,000,000,000) tons of ice.



SEA ELEPHANT AND PENGUINS
ON AN ISLAND IN ANTARCTICA



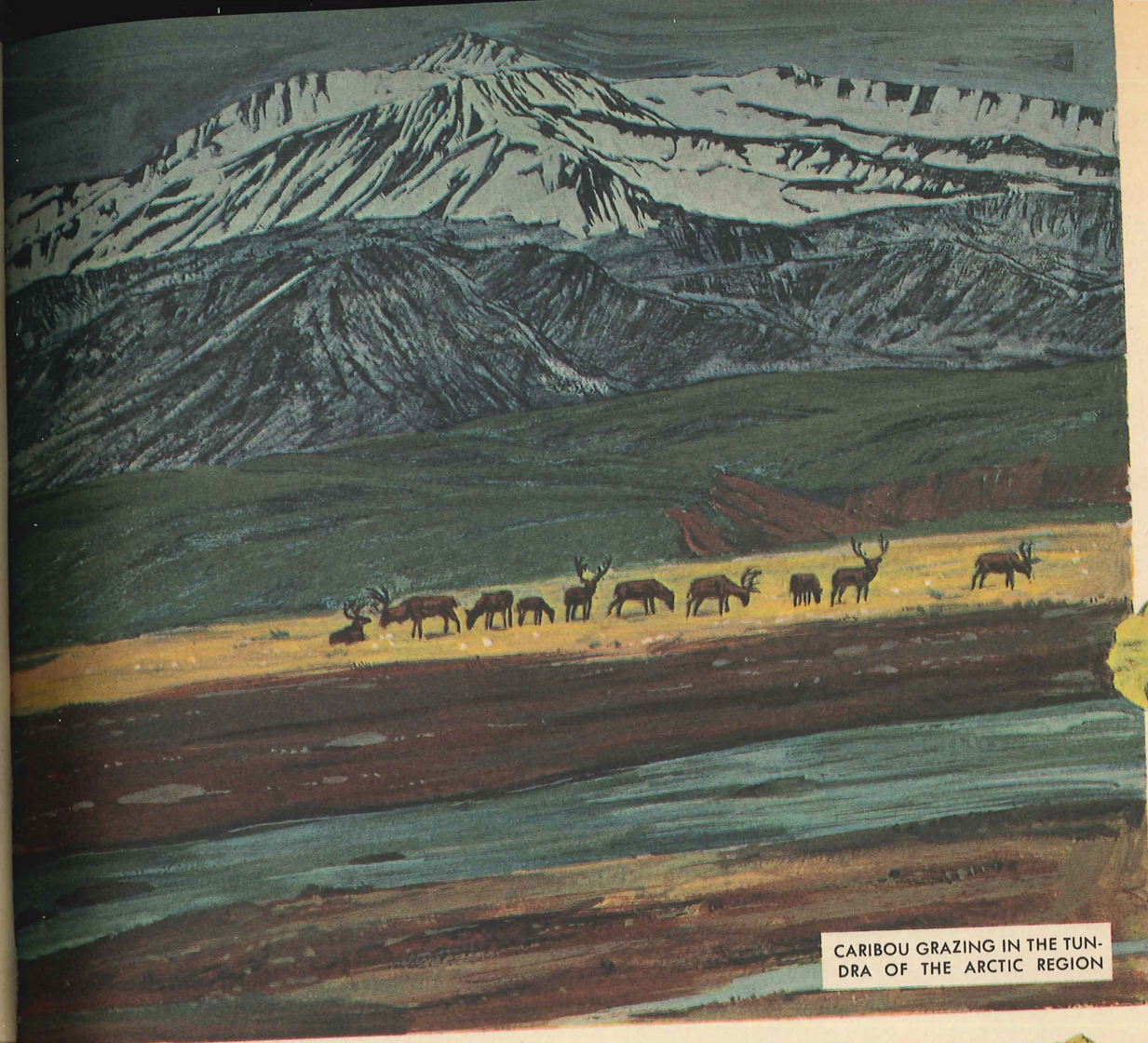
EMPEROR PENGUIN AND BABY



SNOWY OWL OF
THE ARCTIC



ARCTIC WOLF ATTACKING
A HERD OF MUSK OXEN

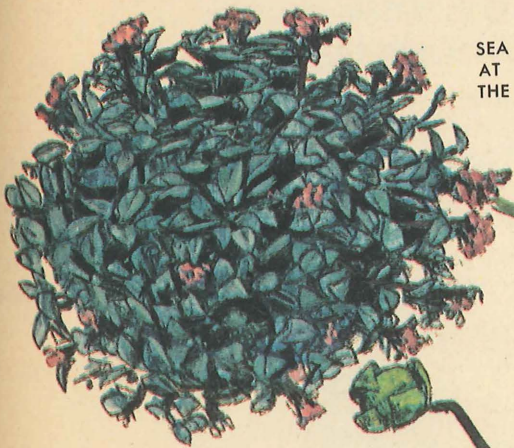


CARIBOU GRAZING IN THE TUN-
DRA OF THE ARCTIC REGION

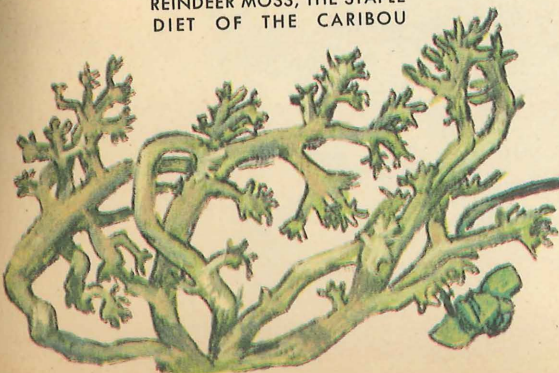
ARCTIC POPPY



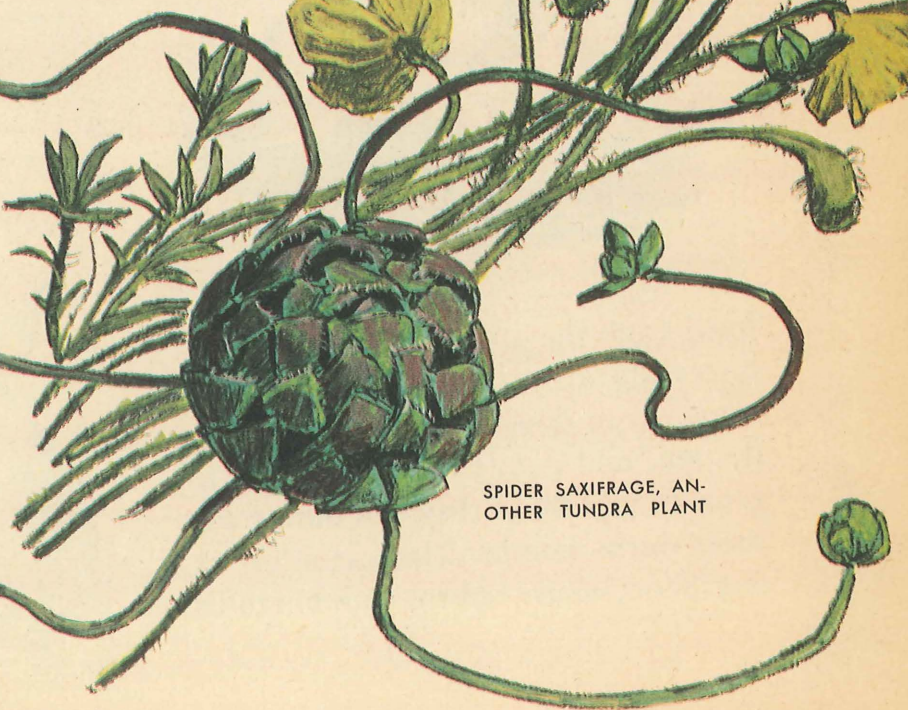
SEA BLUEBELLS BLOOM
AT THE SHORES OF
THE ARCTIC OCEAN



REINDEER MOSS, THE STAPLE
DIET OF THE CARIBOU



SPIDER SAXIFRAGE, AN-
OTHER TUNDRA PLANT



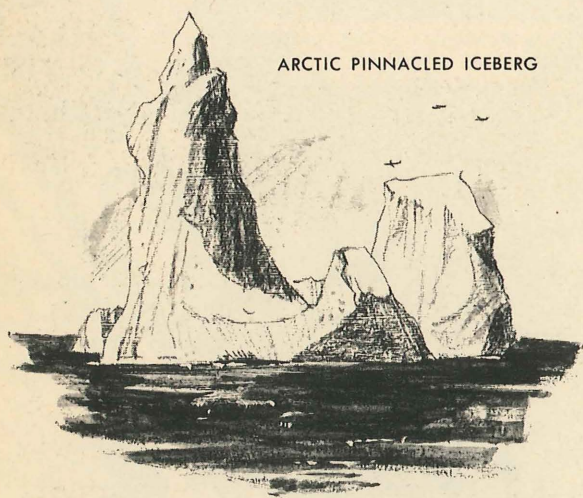
The North Pole differs greatly from the South Pole in that it is not surrounded by a land mass. As

What is the geography of the North Polar Region?

As noted earlier, the Arctic Region consists of an ocean and parts of continents and islands contained within the Arctic Circle.

Expeditions to the North Pole are always faced with the problem of its moving ice. Because it is really a thick sheet floating on the ocean, it very often cracks and separates, sometimes right under the tents of the explorers. Some expeditions have found themselves split in two when the ice broke and a group of tents, dogs, and men began to drift away on the frigid Arctic Ocean.

During the summer, the sheet of ice shrinks, and some parts of the land within the Arctic Circle begin to be



ARCTIC PINNACLED ICEBERG

freed from the grip of winter. Marshy barren lands appear, swift-moving streams run down from the heights to the sea, and plants make an effort to grow as rapidly as they can during the short warm months. These months are few. Soon, winter returns with blizzards

that blanket the lands and bitter cold that freezes even the salt water in the ocean.

The iceberg is one of the greatest men-

How are icebergs formed?

aces to ships and their cargoes that must travel the extreme northern or southern routes. Some are so large that they tower hundreds of feet into the air and extend for lengths of many miles. One was measured at one hundred miles! But the real danger lies beneath the surface of the water because no matter how large an iceberg appears on the surface, there are seven-eighths more beneath. Some have sharp spurs that extend well out beyond the mass. Should an iceberg turn over near a ship, these spurs can rip its metal as though it were made of cardboard.

There are three basic forms of floating ice formations — the Arctic iceberg, the Antarctic iceberg, and pack ice. Each kind is different because each is formed differently. In the North Polar Region, many of the lands within the



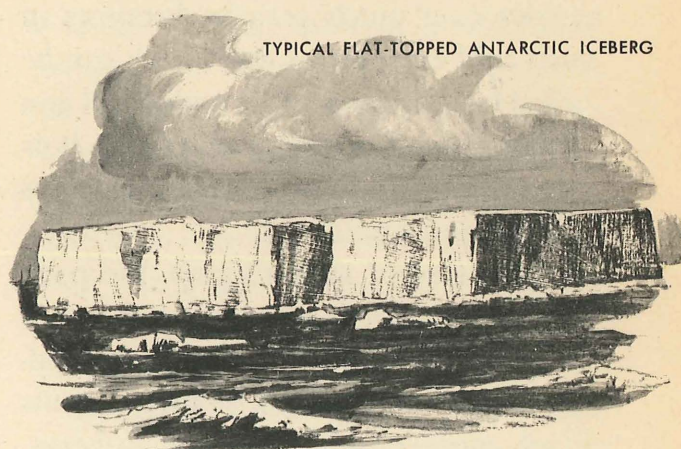
Arctic Circle are mountainous and contain glaciers. A glacier is a river of ice created by the snow which falls upon the land year after year. It is eventually compressed into ice by its own weight. But like the water from which it originally came, ice is also somewhat fluid. These rivers of ice slowly and sluggishly flow downhill into the ocean. They are sometimes hundreds of feet thick and, at the mouth of the glacial river, huge sections will break off and thunder into the water. This is known as "calving." These northern icebergs are craggy and irregular, but with interesting shapes sculptured by the winds and the sun.

In the Antarctic, the icebergs are quite different and make the waters around Antarctica so dangerous that Admiral Byrd named them the "Devil's Graveyard." The entire continent is covered with a sheet of ice, and each winter adds more. This ice flows outward from the center of the continent to the surrounding waters. But when it reaches the edges of the land, it does not break off immediately. Thick

shelves, which extend outward over the oceans for many miles, form. Some of these shelves are permanent formations in Antarctica, and may have existed for thousands of years.

The Ross Ice Shelf, well known as a base camp for many expeditions, is such a phenomenon. In some places, it reaches out for 500 miles! But that is not all that is astonishing about it. The Ross Ice Shelf ranges in thickness from 600 to 1000 feet! We could say that it's the world's largest "ice cube." At the seaward edge of this massive shelf, huge blocks of ice continually break away and float out into the ocean.

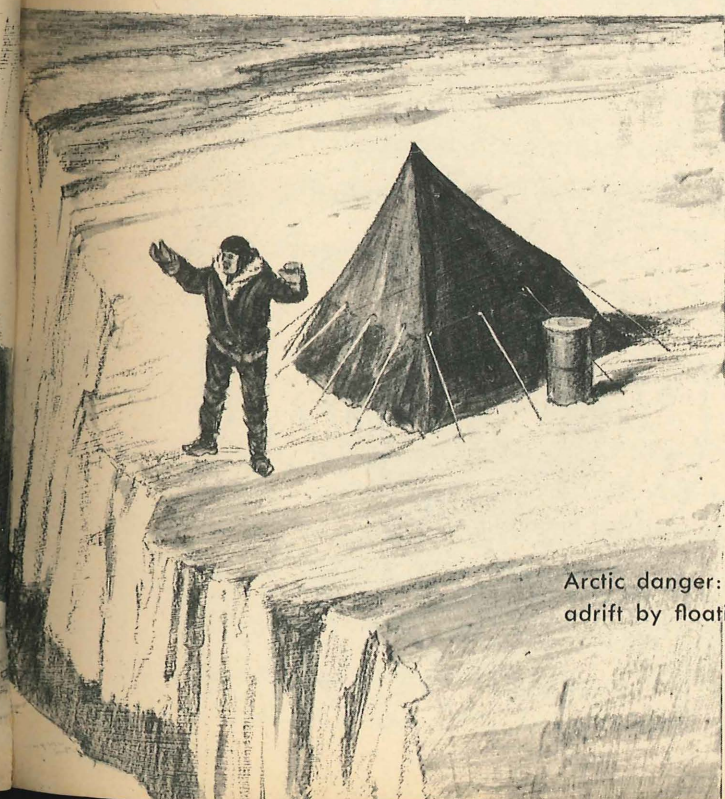
All around the circumference of Ant-



TYPICAL FLAT-TOPPED ANTARCTIC ICEBERG

arctica, these ice shelves "calve" into icebergs. They do not resemble the Arctic bergs at all. There are no towering mountains of shimmering ice flashing in the sun. These icebergs are flat-topped smooth masses that resemble huge rafts.

The third menace which sailors must be wary of is pack ice. This, unlike the other formations, is salt water that the



Arctic danger: The camp of an expedition is set adrift by floating ice that has broken and split.

winter has frozen. In both Polar Regions, large stretches of ocean water develop a thick frozen crust of ice, a crust so strong that it will bear great weight. But when spring comes and the sun, high in the sky, warms the waters, this pack ice begins to soften. Great cracks appear and as more and more of the ice sheet crumbles, the sections begin to grate and grind against each other. If the ocean itself becomes restless, these slabs of ice smash violently, tossing pieces high into the air.

In the Arctic, the breaking of the pack ice is a sure promise of spring and warmer weather. For weeks, the air is filled with roar and rumble as though a battlefield were nearby. Since sound carries over much greater distances in such cold climates (a dog's bark can be heard ten to twelve miles away!), it can deafen a listener many miles off. It is one of nature's most dramatic displays of sight and sound.

Once free of winter's grip, the pack ice begins to drift away from the ends of the Earth into the oceans surrounding the Poles. Since it is thinner, it melts much more rapidly than the icebergs, but still endangers ships.

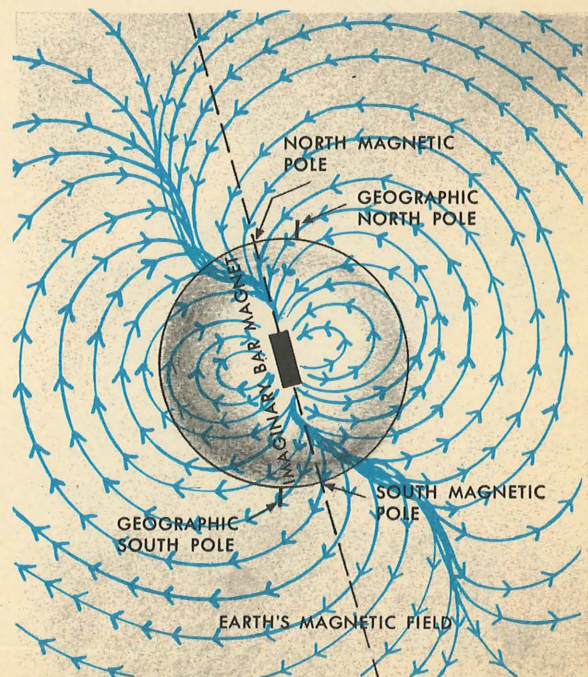
The earth is a huge magnet. It possesses a magnetic field around it as though a powerful bar magnet were embedded in its center. Of course, there is no bar magnet in the center of the earth. Scientists believe that the main source of the earth's magnetism is within the cores of the earth. These cores are probably made of a combination of iron and nickel. They are under tremendous pressure and are

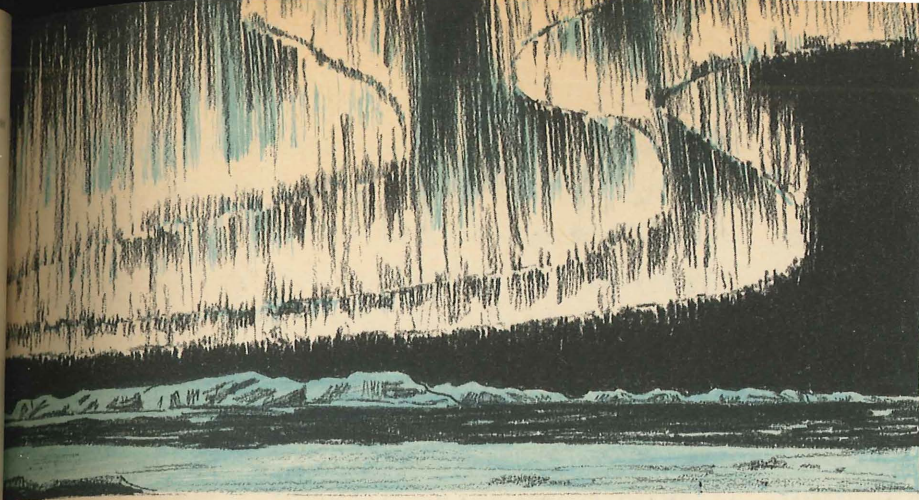
very hot. The inner core, a sphere 1,600 miles in diameter, is probably solid. The outer core, 1,400 miles thick and 1,800 miles beneath the earth's surface, surrounds the inner core. The outer core is probably like a very stiff paste. Slow movements of the inner core within the outer core, and movements within the outer core itself, produce the earth's main magnetic field. Just as in a bar magnet where the electricity is strongest at the poles, the earth's magnetism is strongest at the Poles too, only the Magnetic Poles are not located exactly at the position of the geographic Poles, but about 1200 miles away from them. They deflect our compass needles and are the cause of another natural phenomenon, the Auroras.

During spring and fall, both Polar Regions treat the observer to two of the most beautiful natural displays known to man. They are the Aurora Borealis in the North and

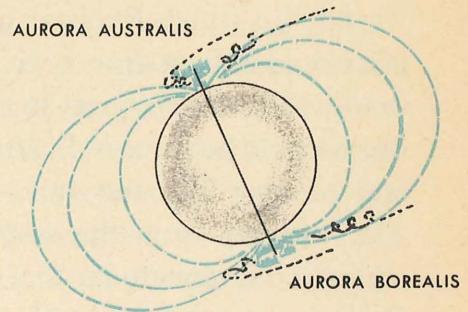
What is the Aurora Borealis?

The Magnetic Poles are about 1200 miles away from the geographic Poles; there are indications that once they were at the same location.





The Aurora, as it appears as electrical "fireworks" in the sky (left), and diagrammatically (below). The colored areas are Auroras concentrated near the Magnetic Poles.



the Aurora Australis in the South. Shimmering sheets of brilliant color appear in the night sky. They take many shapes, sometimes looking like long streamers, and at other times like giant waterfalls of light that seem to plunge from the depths of space itself. The Aurora Borealis glows in delicate yellows, pinks, or lilacs; and the Aurora Australis, in pale green — all against the dark backdrop of a sky studded with the diamond-like glitter of the stars.

The Auroras are electrical displays that have their beginnings in the activity of our sun. During the spring and fall seasons, the sun shoots off great blasts of atomic particles which travel through space at extreme speeds. As they near the Earth, our magnetic field directs them toward the Magnetic Poles, just the way a small magnet attracts a steel needle. These particles, however, are solid bits of matter, even though they

are extremely tiny, and when they enter the atmosphere, they collide with the atoms of our air.

These collisions, and there are millions at a time, result in a release of energy. This energy creates a glow in the sky that wavers and streams as though it were alive. Some Auroral displays have been so brilliant that they have been seen thousands of miles away from the Poles themselves, awesome demonstration of the forces at work in our solar system.

Should our space traveler arrive during such an event, he might well marvel at the majesty of our planet. Even more wonderful is the fact that such natural beauty is born in the most desolate parts of the Earth.

Life near the Poles

Now, let us imagine that our space traveler has come very close to the Earth in a tight orbit that brings him within one hundred miles of the surface. He would carefully scan every land mass

that swept beneath him as he searched for signs of intelligent life. He would find a great deal on the major continents. Cities can be seen from that height, and the geometric shapes of cul-

tivated land are also apparent. If he used a telescope, he would discover roads, bridges, and perhaps large buildings.

But when the alien space craft traversed the Polar Region, the signs of life would almost disappear. In the winter, there is almost none. In the summer, there would be some indications of plant and animal life, but not very much. The voyager from the stars would be tempted to conclude that the Polar Regions cannot support life to any great degree, and that if there were any living creatures in the zones, they would have to be very primitive life forms.

He would be completely wrong. While the Polar Regions do not teem with life, there are populations of plants and animals that cling tenaciously to a precarious existence in the blizzard-swept regions. There are plants, animals, birds — and human beings.

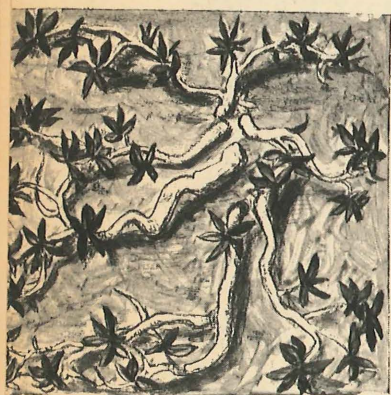
Actually, there is very little life at the Poles proper, but as one travels south from the North Pole and north from the South Pole, more and more signs of life become evident. It is amazing to see

the varieties of plants and animals that manage to survive in an area where the weather is unfavorable and the food supply is at a minimum.

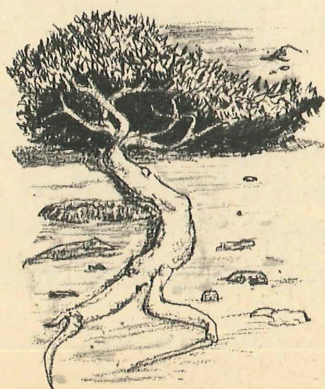
At the Poles themselves, there are no plants at all. The permanent ice cover does not allow any kind of rooting and the seeds that may be blown to these areas can never find a foothold. But several hundred miles away from the Poles are zones of windswept rock, and in the Arctic Zone, even some earth. These furnish a frontier for the very special plants that can manage to live under such conditions.

The plant family known as the lichens is perhaps the hardest plant family in the world. Lichens need only a scrap of bare rock as a base. As they grow, their tendrils explore every crack and crevice as they seek a place to hold against the wind and obtain nourishment from. Most rocks contain minerals released by the physical and chemical forces of the atmosphere, and the lichens use these minerals for food. In addition, they are extremely resistant to cold and dryness. They are a perfect Polar plant, and they exist in both Polar regions on outcroppings of rocks. Some scientists believe that lichens may be found on the planet Mars, where the conditions are thought to be somewhat similar, but even more rigorous.

What kind of plants grow in the Polar Regions?



Arctic willow (left), a sprawling plant normally, hugs the ground even more in the tundra to escape the ravages of the blistering winds.



Black spruce (right), an upright tall tree in the rest of the world, creeps along the ground in the Arctic Region.



Arctic mosses come to life when the snow melts.

The many mosses that crop up after the snow melts in the North Polar Region and the edges of Antarctica create a panoramic carpet of color. Vivid reds, rich greens, and deep blues appear in the desolate coastal reaches of Antarctica and windswept tundra of the Arctic. The Arctic flaunts thick grasses, ferns, and flowering plants, but only a flowering grass and a variety of carnation give a touch of summer to Antarctica.

(See the *How and Why Wonder Book of Mushrooms, Ferns, and Mosses* if you would like to find out more about how these plants live.)

The Polar tundra is an area of northern barren lands that begins some five hundred miles below the North Pole. During the winter, it is completely snow laden, but in the summer, the tundra comes to life. There are no trees at all in Antarctica, and no trees near the North Pole. But in the barren lands of the tundras that cover northern Alaska, Greenland, Canada, and Siberia, some tiny dwarfed willows may be found. That is why the Indians call the tundra "the land of little sticks." There are not enough to even form a forest, and a single tree is a landmark in the endless sweep of open land. (See also P. 13.)

Insects, also, face the problems of living through the fantastically cold winters in the Polar Regions. Like the hardy plants,

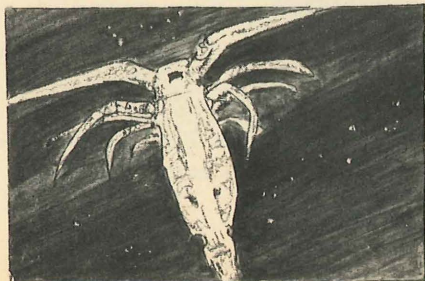
Are there insects in the Polar Regions?

there are also rugged species of insects that can either hibernate through the cold periods or lay eggs which remain dormant until a warm spell. The Antarctic has only forty-four species of insects, mostly mites, ticks, flies, lice, and one variety of mosquito. Their source of livelihood is the penguin, and these insects make the most of the short summer to feed and reproduce before their period of hibernation.

The Arctic Zone is quite different. Much of the land within the Arctic Circle becomes swampy during the spring thaw, and thousands of insect species flourish. They are relatives of the familiar flies, mosquitos, bees, butterflies, and the many ground-crawling bugs that we see during the summer in our own country. Since there are many more plants and animals in the Arctic, these insects find it easier to survive than do the relatively few species that inhabit the southernmost continent of the Earth.

Strangely enough most Polar life lives in the icy seas. One would think that the waters, sometimes only a few degrees above freezing, would not be a proper environment for life, but it is. The cold Polar waters are very rich in oxygen. The warmer currents that flow from the temperate regions toward the Poles bring concentrations of min-

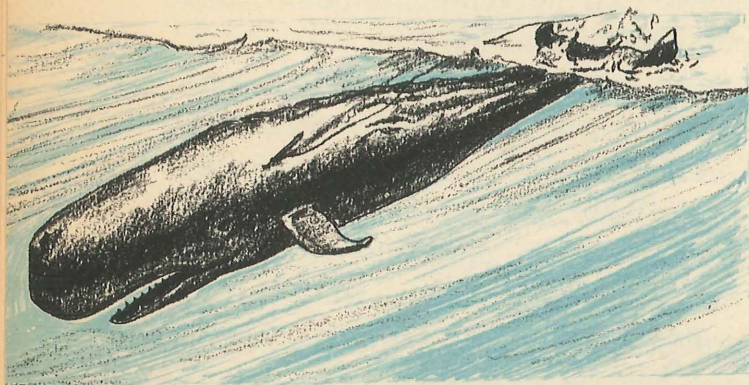
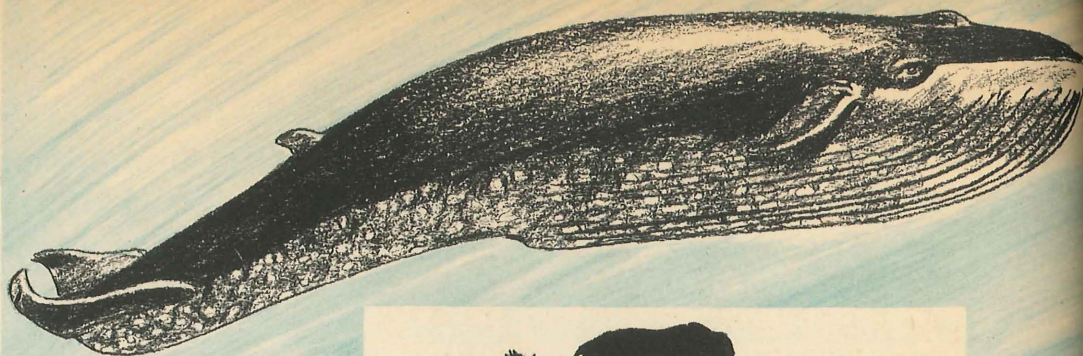
Why does most of the Polar life live in the sea?



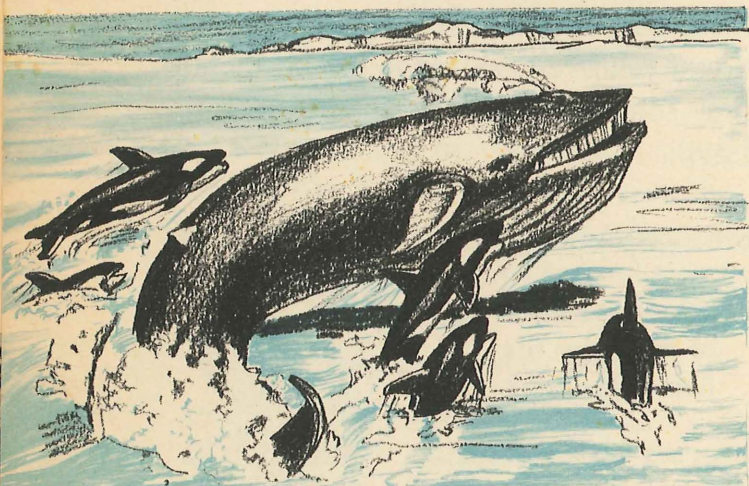
Microscopically tiny young jellyfish and minute crustacea are part of the plankton upon which many of the aquatic animals in the Polar Regions feed.



The whales are the largest animals, and the blue whale, also called sulfur-bottom whale, is the biggest of them all. It can grow as long as 110 feet and weigh as much as 115 tons. It is larger than even the largest dinosaurs. It lives in the Antarctic seas with several other smaller members of the family.



The prize catch of whaling men, the sperm whale, lives in both Arctic and Antarctic waters.



Whales are peaceful animals which live on plankton with the exception of the orc, or killer whale.

erals. This combination, despite the extreme cold, supplies food for the microscopic plants and animals known as "plankton." Polar seas teem with plankton. By comparison, the tropic seas are empty of them. These plankton are the basic food supply of the inhabitants of the Polar seas. Many kinds of fish use plankton for food and these fish, in turn, nourish the large aquatic mammals.

Biologically, the aquatic mammal is the

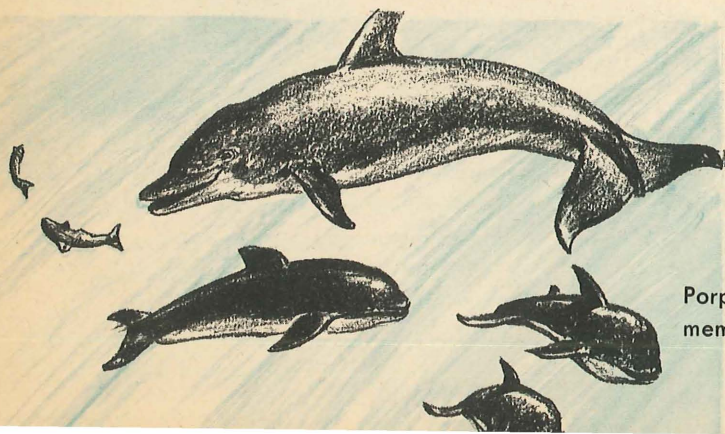
What is an aquatic mammal?

same as a land mammal. It is warm-blooded,

breathes air, and bears live young that it nurses with its own milk. But the aquatic mammal is adapted to live in the sea. It has flippers instead of legs, a sleek body for swimming, and the ability to hold its breath for many minutes.

Among the aquatic mammals, we find the seals, the whales, the porpoises, the dolphins, and the walruses.

The Polar Regions have the greatest concentration of aquatic mammals on the planet. This is due to the abundance of food there, and the ability of these creatures to withstand extreme cold. Contrary to popular belief, fish are not

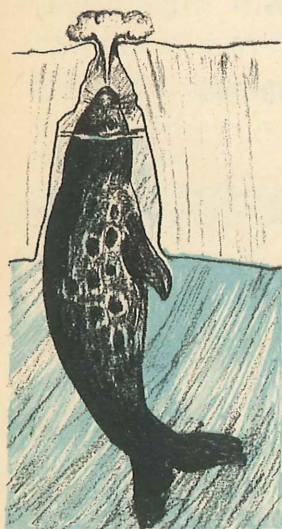


Porpoises and dolphins are members of the whale family.

cold-blooded. Fish have no way of keeping their blood at a constant temperature, and their bodies always have the temperature of the environment. If the water is warm, the fish is warm; if the water is cold, the fish is cold. If the water gets too cold, the fish dies. But the mammals are able to keep their blood at a constant temperature, no matter what the environmental conditions are, and that is why the aquatic mammals thrive in the icy waters near the Poles.

There are no land mammals on the Antarctic continent, and the reasons are apparent. There is almost no food to be found. Plants are rare, and birds are the only wild life.

In both the Arctic and the Antarctic, there are many varieties of birds. Some brave the weather all year, while others migrate to warmer climates when winter sets in. It is in the Antarctic regions that the albatross wings its way over endless seas. Sailors believe that the albatross brings good luck to a ship, but

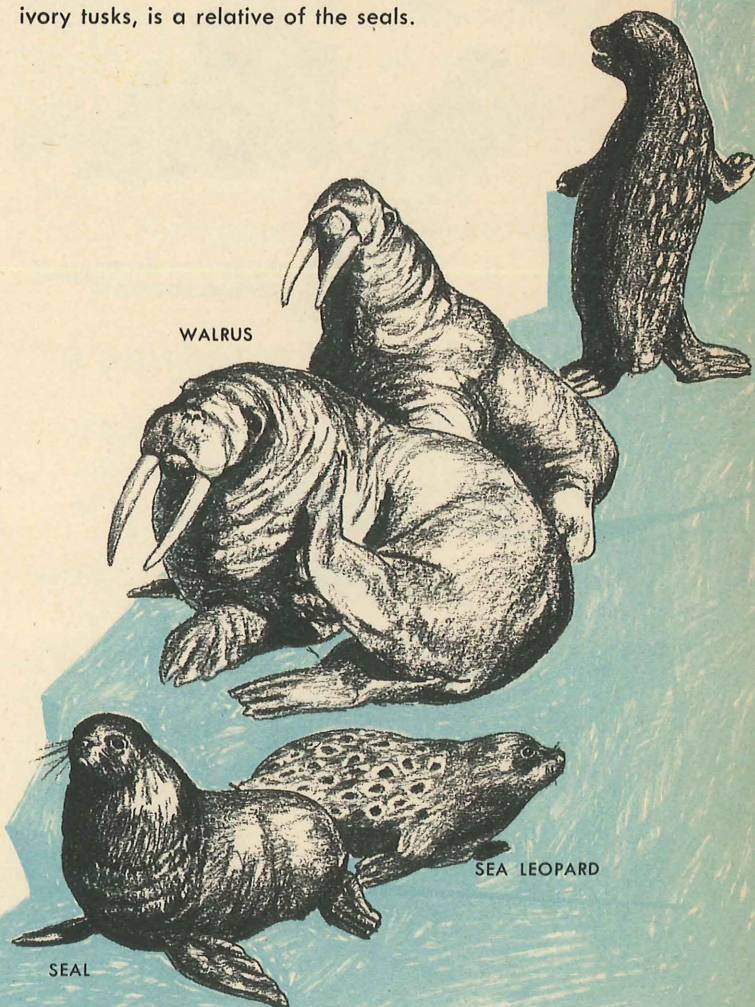


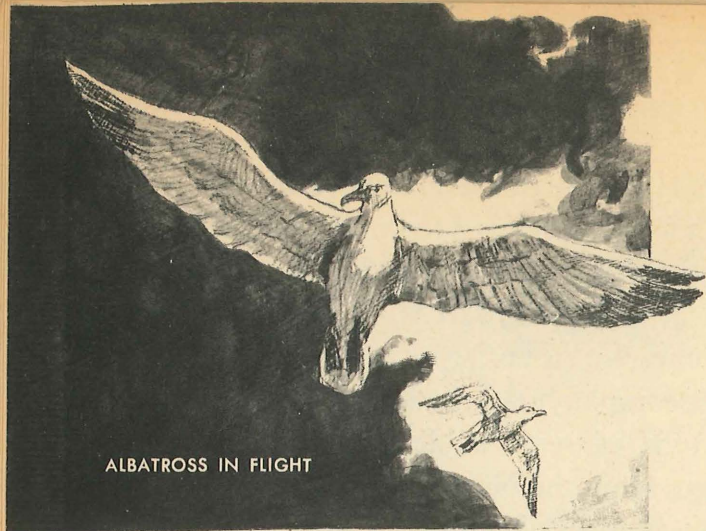
Seals have to surface for air at least once every 10 minutes. That's why they chew passages into the ice (illustration at the left) and keep the breathing holes open for exit onto the ice as well.

misfortune to the man who kills one. With a wingspread of ten to twelve feet, this bird is a perfect glider. It soars effortlessly for hundreds of miles as it searches with sharp eyes for fish.

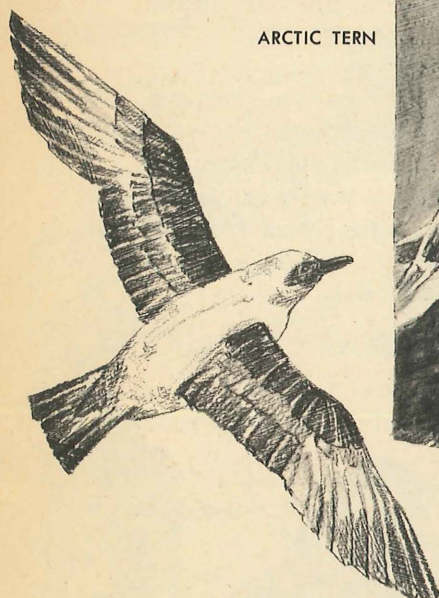
Accompanying him in his hunt are the tern (a remarkable bird in that it ranges from the North Pole all the way to the South Pole and back again), the snow and stormy petrels, and the fierce

Found everywhere in the Polar Regions are the seals, the most common and peaceful of the aquatic mammals. They wander the icy waters in huge herds and congregate on rocky islands in the mating season. They, too, have a killer in the family, the Arctic sea leopard. Living only in the Arctic, the walrus, with its ivory tusks, is a relative of the seals.





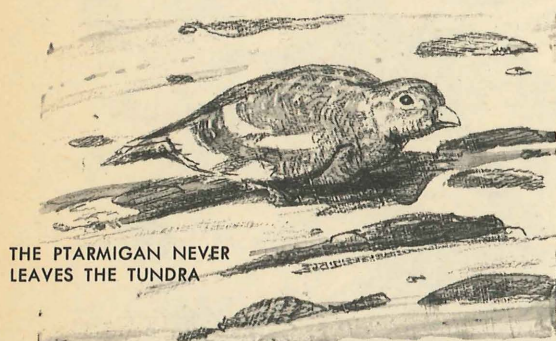
ALBATROSS IN FLIGHT



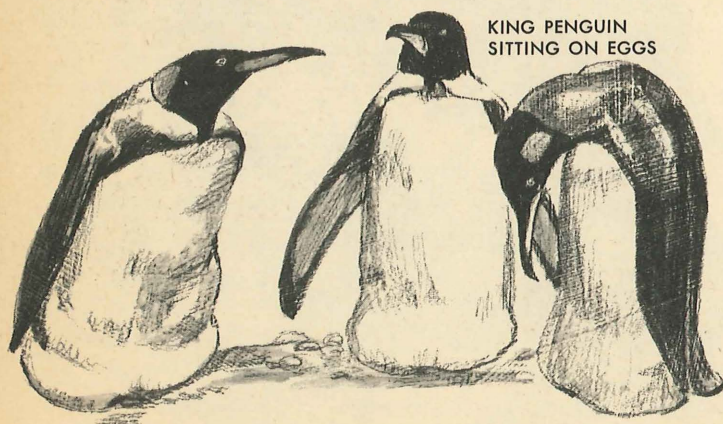
ARCTIC TERN



THE SKUA, A RAIDER OF PENGUIN ROOKERIES



THE PTARMIGAN NEVER LEAVES THE TUNDRA



KING PENGUIN SITTING ON EGGS

South Polar skua. They all look for fish. In the southern Polar Region, the sea is the only source of food.

The most astonishing birds in the world

are the penguins
What bird can swim like a fish? that inhabit the icy shores of Antarc-

tica. They are flightless birds whose wings have evolved into efficient paddles. These appendages, plus powerful webbed feet, make the penguin an expert swimmer. Since its only food is fish, the penguin has learned to swim as well as most fish. It can dive into the water so smoothly that hardly a ripple is left on the surface. Then it ranges deep under the water, moving like a silent torpedo. When a penguin leaves the water, it must hurl himself into the air since it is impossible for it to climb up on the ice.

On the ice, a penguin waddles about in a most comical manner. The bird's dark back and wings and white chest make it look as though it is eternally dressed for a formal occasion. Penguins build little nests of pebbles, and males and females take turns during the incubation period of their eggs. Groups of thousands follow explorers in a curious and friendly manner. (See also P. 12.)

The warm-blooded living creatures of the extreme North and South are born with

How can land animals withstand the cold in the Polar Regions?

built-in mechanisms that enable them to cope with the bitter living conditions that prevail.

The first is insulation. The birds are equipped with thick layers of sleek, closely packed, and oily feathers. The mammals are heavily furred, some with a double layer; this fur is oily, too. Underneath the skin is an extra layer of fat. So, they are all well padded.

Obviously, the most vulnerable parts of an animal or bird are the legs. But they cannot be bulky with thick fur or a layer of fat. That would hamper muscle movement and make them less agile. The problem of keeping the legs warm is solved by nature in another way entirely. All Polar creatures have increased blood circulation to the legs. This additional flow of blood that has been kept warm within the larger mass of the body keeps the legs from freezing. However, the blood could cool in the legs and, when it returns to the heart and lungs, chill them seriously. Therefore, to prevent the blood from cooling too much, the major blood vessels, veins, and arteries are placed more closely together in the center of the legs than in other animals. A network of capillaries radiates from them to reach the edges of the skin, and the main vessels inside stay protected. In

addition, the cooler blood is warmed as it returns to the lungs since the veins are located alongside the warmer arteries. The entire system is a model of design and efficiency.

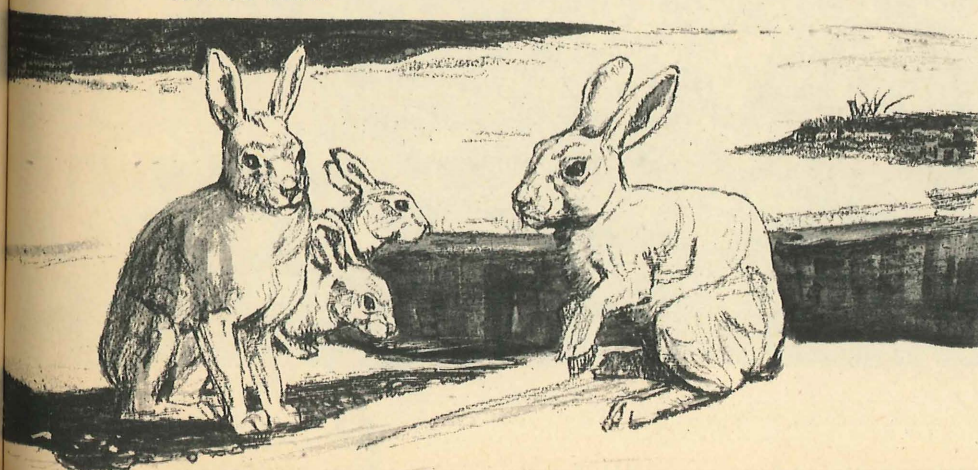
This adaptation against cold serves another purpose. Only a very deep wound would reach a major blood vessel and the Polar animal can sustain the cuts, gashes, and bites it must endure without losing much blood.

The final adjustment to the Polar climate is a constant appetite. Food is converted into heat and nourishment by the biological processes of the body. To stay warm and healthy, Polar animals eat often. In the temperate and tropic zones, animals eat heavily and can relax until the next meal. The Polar animals do not live so simple a life. They must be constantly on the prowl for food. Fortunately, it is there to be found.

The polar bear, or "Nanook," as the Eskimos call him, is the King of the North. Adapted to every form of terrain that the Arctic region can offer,

What animal is called "the King of the North"?

The protective coloring of their fur makes the Arctic hares (below) and the weasel or ermine in its winter coat (at right) blend perfectly into their snow-covered world.



Nanook can run across the ice faster than a man, climb rocks and ice ridges, and swim through the water with great agility. His snow-white fur camouflages him perfectly, and he can stalk his prey in complete silence. Nanook is feared by both animals and men in the icy North for the strength contained in his thousand-pound body makes him a powerful fighter.

Following the polar bear in his ceaseless quest for food is the Arctic fox, a sly bright-eyed member of the canine family who waits until Nanook has finished his meal and then feasts on what he leaves behind.

The Arctic wolf, heavily furred and powerfully built, is not only the most intelligent animal of the Far North, but also the fastest. Hunting in small groups or even singly, an Arctic wolf can run down the swift snow-white Arctic hare and corner the shaggy musk ox and caribou. This animal will even creep up on an unsuspecting bird that settles on the ice for a moment.

Despite his hunting skill and ferocity,

the wolf is not a danger to man in the Arctic. Although he fears no one, except Nanook, he will lope away from the scent of a man, and hunt him only when there is no other food to be found.

When he hunts in the tundra region, he finds plenty of game. Little lemmings (certain small rodents), moles, and other burrowing animals dart about on the frozen ground while northern birds like geese and ptarmigan (a species of grouse) nest in the hollows.

You read that Nanook, the bear,

Did a polar bear is fast, and
ever catch a penguin? that the penguin can swim

like a fish. Do you know why no polar bear has ever caught a penguin? If one had, the penguin meat might have been a welcome change in diet. The question is a trick question, and you know the answer if you have read carefully up to now. Ask your friends. If they don't know, tell them that the distance between the North Polar Region and the South Polar Region is just too great, even for a hungry polar bear. Polar bears live only in the Arctic, and penguins, only in Antarctica.

Which animal is the fastest runner in the North?

not only the most intelligent animal of the Far North,

THE GRIZZLY BEAR OF THE TUNDRA

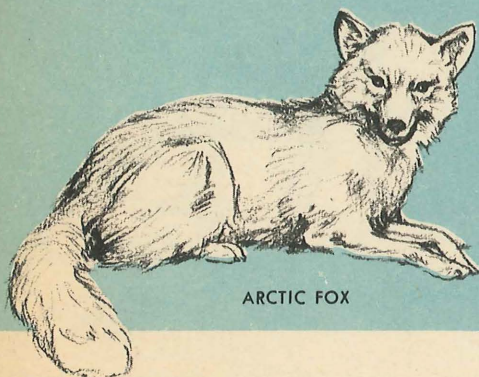


LEMMING, A MOUSE-LIKE CREATURE

WOLVERINE OR GLUTTON, A NIGHT PROWLER ALONG THE COAST OF THE ARCTIC OCEAN.



ARCTIC FOX



The People Who First Lived in the Arctic

Unreel the spool of time and spin it backwards. Let the years, like thread, sift through your fingers and your mind. Spin it faster and watch the centuries of the past appear one after another until the years number in the thousands. Stop when you arrive at a time some twenty thousand years ago. Then, travel north through the Great Plains, the Canadian wastes, and the snowy terrain of Alaska. Follow Alaska till it ends at its extreme tip, and move out across the scattered islands until you reach the Bering Strait. This is where, most anthropologists agree, the people who first lived in the Arctic crossed into the New World before the dawn of written history.

The Eskimos are the people of the Far North who inhabit the Polar icecap and the barren lands within the Arctic Circle. Scientists believe that they came from the broad plains of Mongolia, the last group of a migration that began twenty thousand years ago, when the

Where did the Eskimos come from?

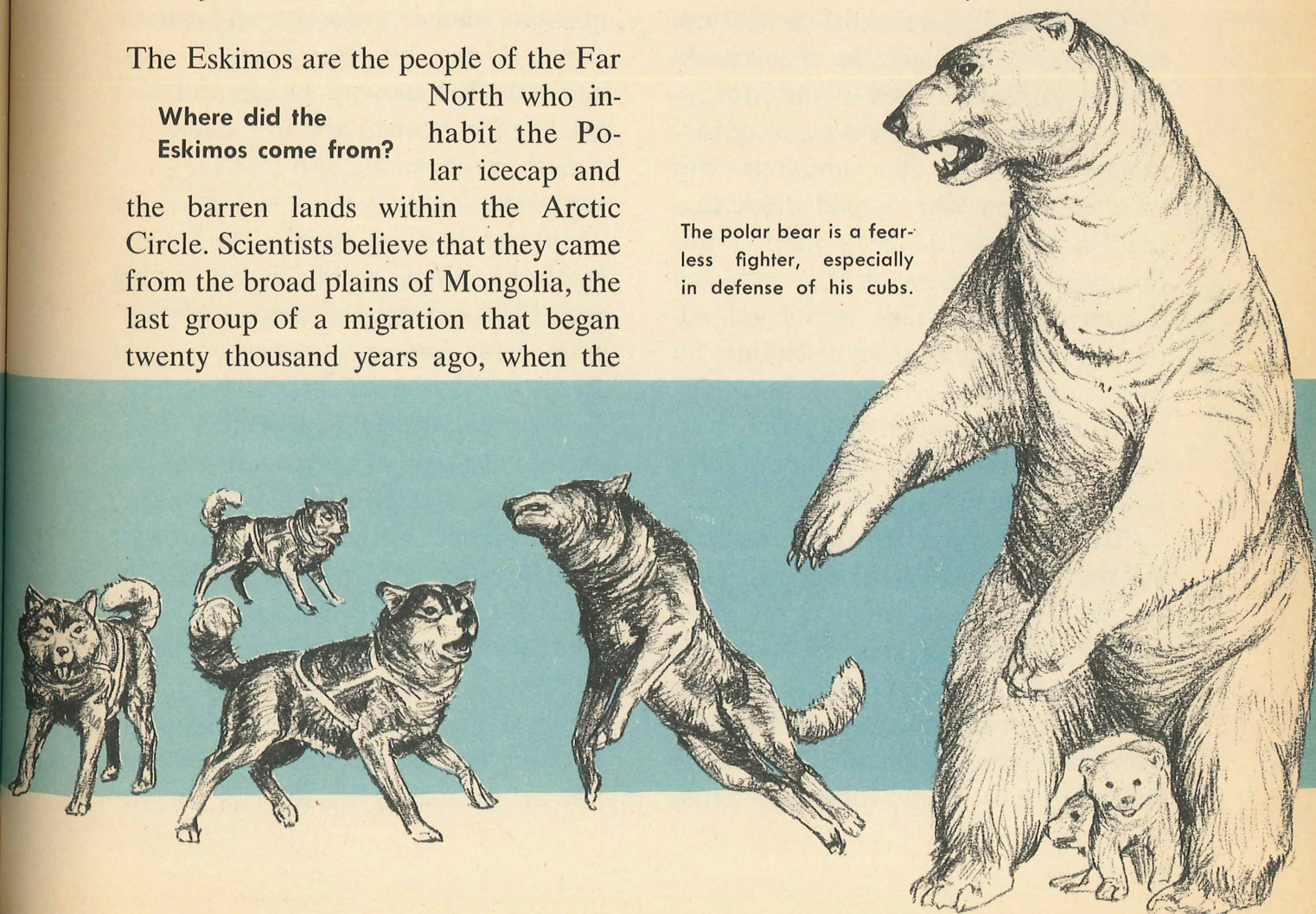
North who inhabit the Polar icecap and

first of the Mongolian tribes crossed the Bering Strait, perhaps on an ice bridge, and that lasted for thousands of years. No one is sure why they left their old homelands. Perhaps they were driven out, or maybe they were looking for a land that would provide for them more abundantly.

Another theory is that they followed the slowly retreating glaciers after the last ice age, moving north after the animals that were adapted to the cold weather. The first emigrants became the people we now know as American Indians; they moved south, slowly populating sections of North and South America.

(Our *How and Why Wonder Book*

The polar bear is a fearless fighter, especially in defense of his cubs.



of the North American Indian tells the exciting story of these people.)

The ancestors of the Eskimos arrived in a barren, bitterly cold region. But when they tried to move farther south, they undoubtedly found the lands well-defended by the tribes that had come before them. They had no choice but to remain in the frozen northlands and find a way to survive in this most inhospitable part of the planet.



The Eskimo people are not backward, just primitive. **Do Eskimos differ from other people?** Their only difference from other people of the world is that they have learned to live, find food, and raise their children in a region where a mistake means quick death.



The Eskimos are short in stature, dark-haired, and have the high cheekbones and slanted eyes of the Mongolian. Almost all are good-natured, fun-loving, and rear their children with great affection. One would think that the Eskimos would be a hard, bitter group with a temperament that reflected the environment. This is not so. Although they impose strict disciplines on their families, these men meet hardships cheerfully, face death daily with deep calm, and are perhaps the most hospitable people in the world.

Eskimos are established in northern Alaska, Canada, Greenland, and Labrador. Their daily lives there most closely resemble those of the American Indians. We are concerned here with the most northern group, the people who live on the icecap and are known as Polar Eskimos. Theirs is the most prim-

itive culture in the world, with no tribes and political organizations. These people travel as simple family units, just as Stone Age men did far in the distant past.

The igloo is the basic dwelling of the Eskimo. The word **How is an igloo built?** means "snow house" in the Eskimo language and it is perhaps the most ingenious house built by primitive people. An igloo is made of the most common item in the North — frozen water, or snow. The wind-driven flakes of snow that can mean death to an Eskimo when they turn into a howling blizzard can also save his life when he packs them into blocks of snow to build an igloo.

The igloo is constructed of blocks of snow, stacked to form a hemispheric dome. Using his semi-circular snow knife, the Eskimo cuts blocks and then stacks them around him in a circle. He cuts them at an angle so that they will slope inward, and mounts them in a continuously rising spiral. The Eskimo builds his igloo from the inside, cutting the blocks from a deep snowdrift around his feet so that the floor sinks as the structure rises. When he is done, he is surrounded by a perfect dome that covers a pit as deep as the dome is high. This half-ball of a house is an aero-dynamic design that presents the least resistance to howling winds. The blizzards can whistle by, but they only swirl harmlessly around the snug little shelter.

Once the igloo is finished, a small hole is punched through the top to let hot air escape, and a door is cut into

one side which leads into the covered passageway that serves as an exit. Sometimes, this passageway leads into a smaller igloo which shelters the sled dogs. While the Eskimo is erecting his shelter from the inside, the rest of his family is working outside, packing every crack and crevice with loose snow until the home is practically airtight.

Skill in building an igloo rapidly often means the difference between life and death. An Eskimo, alone on a hunting expedition and miles from his home, will die rapidly in an Arctic blizzard. Once he sees the signs of such a storm, he begins a small igloo for protection. If he is fast — and they all are or they do not survive — he can make one in twenty minutes. It is one of the necessities of North Polar existence and a true survival technique.

The interior of a family igloo is very simple. There is no furniture, for an Eskimo carries all his possessions on his back or on his sled. The igloo is usually furnished with several couches made of packed snow and covered with animal skins. They serve as seats, beds, and tables. A snow shelf on the curving wall holds a small stone oil lamp which spreads a warm yellow glow. Food is kept in the passageway that leads outside. With a reserve of food and oil at hand, an Eskimo family can withstand the worst blizzard.

After an igloo has been in use for a few days, the heat of the oil lamp and the body heat of its inhabitants melt the inside layer of snow, which then re-freezes into an icy glaze. This glaze is

additional protection in that it both insulates the shelter and reflects the heat back to the people.

The igloo is a truly efficient dwelling. It can maintain an internal temperature that, in some cases, is ninety degrees higher than the air outside! When the outer air temperature is 60 degrees below zero, the temperature inside the igloo can be as high as 32 degrees. Of course, 32 degrees is not warm to us, but to an Eskimo, it is steaming hot. He will remove all his clothes and bask in the warmth. And remember, 32 degrees is the temperature at which water freezes! This is a graphic demonstration of the adjustments that the human body can make.

As noted before, Eskimos do not travel in large groups. Each family lives by itself, constantly hunting food. But when a lone traveler chances upon an igloo, he is immediately welcomed and fed like an honored guest.

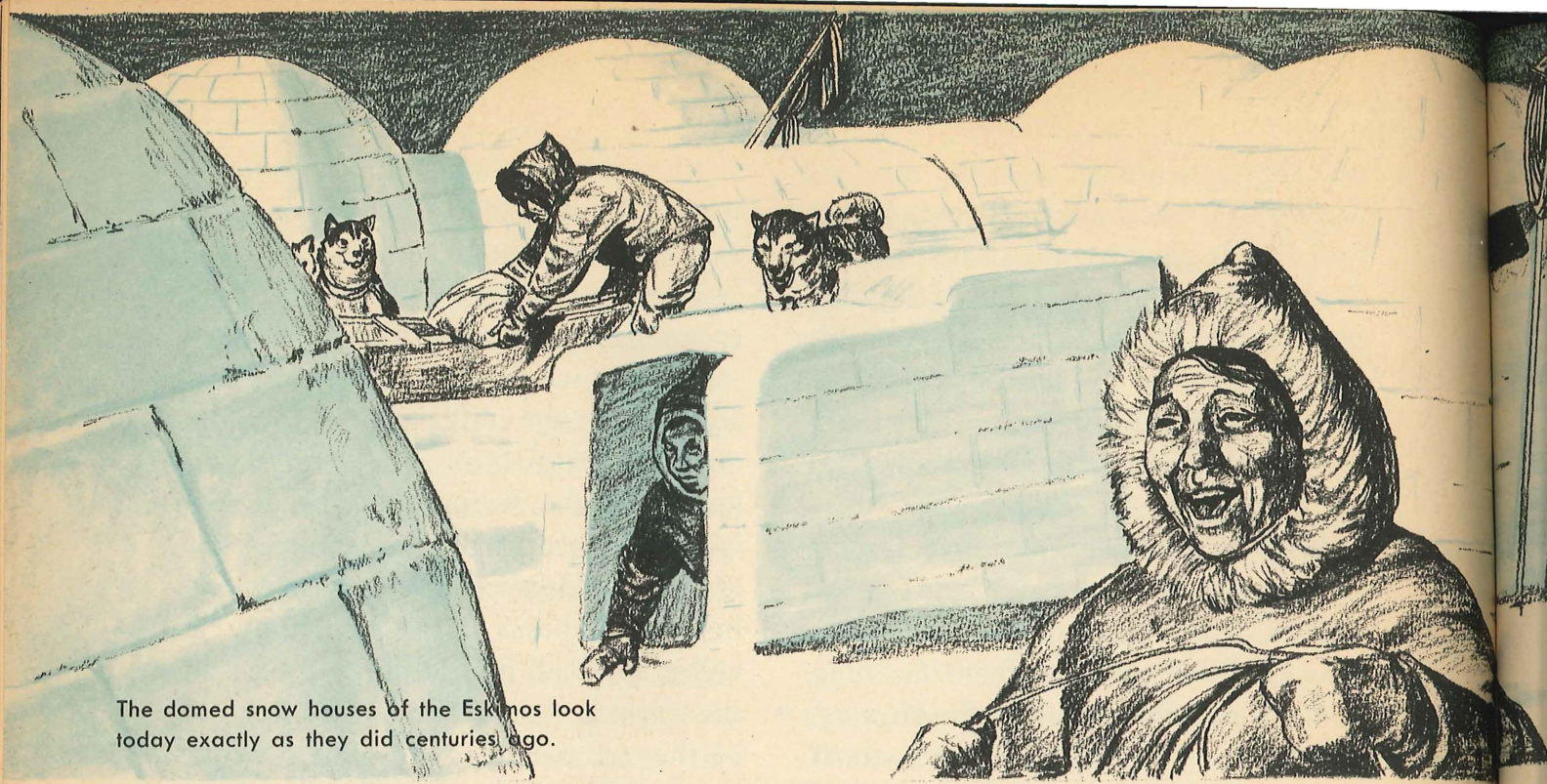
Every spring, the Eskimos travel to a central meeting place where they enjoy festivities, trade weapons and furs, and try to find husbands for their eligible daughters.

These men of the North have developed a marvelous boat, the kayak. It is a slim craft, pointed at both ends, that can be navigated by one or two men. Its basic construction is a framework of wood, or strips of whalebone, with a covering of walrus hide. The seat is enclosed in a tiny cockpit with laced flaps that can be tightly wrapped around the body of the boatman. This

How is an igloo furnished inside?

How do the Eskimos travel on the water?





The domed snow houses of the Eskimos look today exactly as they did centuries ago.

makes the entire craft watertight. It can be turned over in the water, and the boatman will stay dry from the waist down. Using a *kayak*, an Eskimo can make fairly long trips across very rough open water.

There is a larger boat that can hold an entire family. It is known as an *umiak*, and is constructed on a broader frame than the *kayak*. The beam is wide, much like a rowboat, and it is not decked. The *umiak* is used for carrying supplies and food across stretches of water.

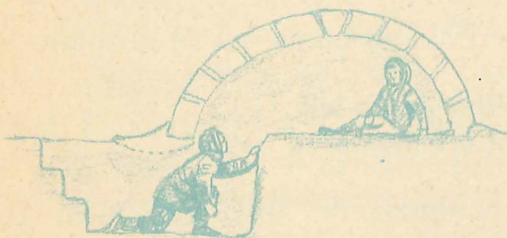
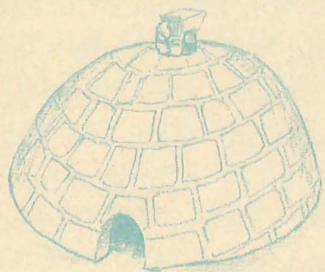
It is as a hunter on the ice where the Eskimo shows his special skill and imagination. In recent years, Eskimos have acquired rifles. This has somewhat changed the ancient hunting patterns, which were quite inventive and interesting.

Their fishing is much like ice fishing anywhere. A hole is chopped through the ice, a baited hook is lowered, with

the line fastened to a crossed stick that will wave a flag when a fish takes the hook. An Eskimo sets out many of these. Then, he and his sons build a windbreak of snow, and carefully watch the flags. When one begins to bob violently, the line is pulled rapidly out of the hole. The fish is tossed on the ice — where it freezes instantly!

Seal-hunting is much more exacting. Seals will tunnel up through the ice and make a tiny air hole so they can breathe without having to find open water. An Eskimo waits patiently for days and days at one of these holes, harpoon poised and knife ready. When the seal enters his vertical tunnel, the harpoon is driven down, its barbs locking into the flesh. Then, a monumental struggle begins. The Eskimo must hold the thrashing animal with his harpoon

Kayak and umiak are perfect means of transportation on water and just light enough to be carried, if necessary, over ice.



The building of an igloo is an ingenious undertaking. (Doing it fast often makes the difference between death and survival.) The hole you see in Drawings 2 and 3 is just a temporary entrance. Later, the real entrance is tunneled under the snow as shown in Illustration 4. This way, the howling wind cannot enter the igloo.



The inside of the igloo is warm and comparatively comfortable for as many as five people. Temperatures often go above 60° F.



while he hastily breaks enough ice around the hole to stab down with his knife. Then, with the aid of his dogs, he pulls the seal from the water. It will supply his family with food for a week.

Walruses are usually harpooned in open water and towed onto the ice. They are more dangerous than seals because of their weight and long tusks; an Eskimo really risks his life during a walrus hunt.

But the most dangerous game is Nanook, the polar bear. The Eskimo prizes the white fur of Nanook and will go to great lengths to kill him. But the polar bear cannot be hunted at the same close range used for the seal and walrus. It is a resilient animal that cannot be killed easily. In addition, a wounded bear is even more dangerous. Generally, an Eskimo allows his dogs to scent out, track, and surround a bear. Then, he tries to injure it by casting spears. He hopes to wound Nanook so severely that the bear will soon bleed to death. This is a touchy task. Many dogs are often sacrificed to the savage rage of the bear, and many an Eskimo has been killed by a single swipe of its powerful paw.

To avoid the fighting wrath of Nanook, the Eskimo has devised a most unique weapon. When he spots the trail of a bear, he prepares a set of whale-bone strips, each about a foot in length. These have been scraped quite fine and have razor-sharp edges. Then, they are rolled up like springs, and wrapped in pieces of warm blubber. Holding the blubber, the hunter leaves his igloo. Outside, blubber freezes instantly, locking the knife-like springs inside. These pieces of bait are set out where the

bear tracks were spotted. The Eskimo waits patiently. When the bear finds one of these tid-bits he swallows it whole. Disaster! Inside its stomach, the blubber warms and melts. The coiled whale-bone springs open, cutting the bear's insides to ribbons. Now, the Eskimo moves out and slowly follows the track of the dying bear. When death finally comes, he loads the carcass on his sled and brings it home.

These are only a few of the artful ways in which the Eskimo hunts. But he takes it for granted as being all in a day's work. The important thing is to find food.

The Eskimo hunts out of absolute necessity, and uses almost every part of the animals he kills. The meat and blubber are used for food, and sometimes eaten raw. This does not sound tempting to us, but a cooking fire is difficult to make, and such raw meat supplies the Eskimo family with the high protein diet he needs for energy and warmth.

Almost every other part of the animal's body has a use. Cured, the gut and sinews make fishing lines, dog



traces, and thongs to hold clothing together. Skins and fur hides are cured by chewing! This is the woman's task. She patiently chews on every bit of a hide until it becomes soft and pliable. Then, she cuts it into sections and joins them to make clothing.

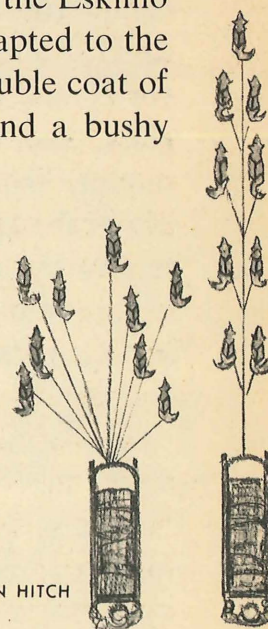
The cold-proof parka is an Eskimo design that we have copied for our own winter clothes. Most Eskimo clothes are loose-fitting, with the fur inside; air space between the hide and the body is an excellent insulator against Arctic cold. Eskimo boots, called *mukluks*, resemble high moccasins and lace tightly to keep the feet dry.

Walrus hides are used for boat hulls and bones, and ivory tusks become knives, spear points, and tools. Larger pieces of bone and ivory are fashioned into slit-eyed snow goggles to protect the eyes against the brilliant glare of the sun as it reflects from the ice. Some animal fat is used for food; the rest is rendered into oil for the lamps. Even the dogs share in the finds of the hunt, eating whatever the Eskimo does not use for himself. Nothing is wasted. Since there is little else to be found in the Arctic, the Eskimo makes every use he can of the Arctic animals in his quest for food, weapons, and utensils.

Without the sled dogs, it is doubtful whether the Eskimo owes his survival. The relationship between an Eskimo and his team of Huskies goes far beyond the usual friendship between man and animal.

As draft animals, the dogs pull a sled effortlessly hour after hour, working tirelessly in the service of their masters. In the hunt, they track animals, bring them to bay, and aid in the kill. The Eskimo's obligation to his dogs is to supply them with food (a Husky eats as much as a man). So, both man and animal work together to insure each other's survival.

The Husky, probably brought over from northeast Asia during the Eskimo migration, is completely adapted to the wintry North. He has a double coat of fur, short insulated ears, and a bushy



FAN HITCH

FEATHER HITCH

A team of huskies hauls sled and load with astonishing ease. The harnesses are usually made of walrus hide and are fitted to avoid interference with the dogs' legs. The "fan hitch" is for travel in open country, while the "feather hitch" is used where obstacles can be expected and driving has to be more accurate.



plume of tail that covers and warms his nose and mouth when he sleeps in the snow. His broad paws grip the ice firmly, while his stocky body and deep chest provide pulling power.

Without his dogs, an Eskimo could never bring the kill of a hunt back to his igloo, defend himself against the polar bear, or find enough game. In his constant fight for survival, they are his assistants, protectors, and companions.

The people known as Eskimos inhabit

Do other people live in the North Polar Region? northern Alaska, parts of

Canada, Greenland, Labrador, as well as the Polar icecap. However, two other northern areas have primitive tribal cultures that brave the rigors of the North Polar Region. In Siberia, Komi, Kamchadals, Yakuts, Samoyeds (or Nentsy), Tungus, Koryaks, Yukaghirs, and Chukchi roam the barren tundra. They do not live quite the same life as the Eskimos because the tundra terrain is different. Some of these people are reindeer-herders and, in this occupation, they resemble the Laplanders, or Lapps, who inhabit the northern extremes of Russia's Kola Peninsula, Finland, Norway, and Sweden. Many Lapps are blond and blue-eyed, the result of marriage with Scandinavians.

As a result of the spread of other peoples to remote corners of the world, and the

What is happening to the Eskimo today?

scientific importance of the North Polar Region in general, the Eskimos are slowly being modernized. They hunt with rifles, live in settlements, and send their children to school. Many of the men have learned trades, and their long heritage of inventiveness makes them wonderful mechanics.

But the Eskimos also show artistic skill. Many of their implements are decorated with delicate intricate drawings and designs. Some depict hunting scenes; others have interesting ornamentation. Recently, the Canadian Government has been encouraging the creativity of the Eskimo and, as a result, many Eskimos are making stone sculptures. These works of art can be bought in many of our big cities; the profits are returned to the artists.

The old ways are going. The modern Eskimo is taking advantage of new opportunities. This is all to the good, for the life span of these people has increased, and their numbers are growing. For a time, it was feared that the Eskimos were a vanishing race. Now, it appears that the Eskimo will eventually become a valuable member of the world community.

The Men Who Found the Poles

Men have always searched for distant lands. They had many motives — glory, financial reward, or perhaps a longing for adventure and danger. No matter what the motives were, they led

to the discovery of new places, and new passageways. The Polar Regions have always challenged man. Many set out, only to be conquered by the hazards. Many were turned back by the forbid-



Eskimo mother and child show typical Asiatic features.

A Norwegian Lapp mother and child. The Lapps, related to neither the Asiatic nor the modern European races, are the remnant of Europe's aboriginals.



Lapps with their most valuable livestock, the reindeer.

ding conditions. Some triumphed, but the victory was hard-won. Polar explorers did not return with shipholds filled with gold or native art. They came home, those that *did* return, with frost-bitten fingers and toes, stories of strange icebound lands, and a wealth of scientific information.

Reaching the top or bottom of the world became a grand prize. When finally done, the achievement was the result of hard bitter work; planning, and endurance; the agony of seeing comrades die; the personal hardships of hunger, weariness, and struggle; the anguish of defeat and tragedy.

The Poles were not easily won. The forces of nature exert their greatest power in the Polar Regions. They put up barriers to the progress of man that are as relentless as the movements of the planets around the sun — and just as impersonal. Whether men are there or not, the elements go their brutal way. The winds howl and drive the thick clouds of snow. The icy cold of space grips the Poles each winter. The seas rage and ice floes smash ahead.

Yet men pushed to find the Poles. Century after century, expedition after expedition, brave explorers outfitted themselves and set sail for the ends of the earth. None of them had ever set foot on this ground, and it was a beckoning challenge. The spirit of their quest is best defined on a stark cross that stands at the South Pole in memory of Robert Scott and his men, who died there in 1912:

“To strive, to seek,
To find,
And not to yield.”

TO THE NORTH

Around 325 B.C., the Greeks chose a

Who was the first
explorer to see
the frozen North?

man to sail to the
North. They were
not interested in
the North Pole,

but in the British Isles and the northern part of Europe. They wanted to set up overland trade routes to assure their supply of tin and amber. The man the Greeks selected was a scientist and a scholar. His name was Pytheas, a quiet student of geography and astronomy. But how to elude the Carthaginians who controlled the sea lanes through the Straits of Gibraltar, and find a way to the North?

Pytheas did succeed in avoiding the Carthaginians and sailing due north. He visited all the islands that are now known as Great Britain, explored the Germanic coastline of Europe, and traveled up along the rocky coast of Norway. No one knows how far he went, or if he actually crossed the Arctic Circle, but his reports show that he did get close to the Polar Region.

The ancient Greek considered Norway the end of the world. Pytheas claimed to have seen beyond it. He was the first man from the civilized world of his time to see the frozen Arctic Ocean, to witness the strange midnight sun, and to wonder at the glory of the Aurora Borealis. He was the first Arctic explorer.

To be sure, this Arctic venture was not the purpose of his voyage, but it turned out to be the most important. He brought back news of a strange region of the Far North where winter,

with its ice and snow, reigned the year round.

Polar exploration subsided after Pyth-

How far north did the vikings explore? eas' journey. In those days, there

was little to be gained from a venture into icebound seas, and, besides, the European people were too busy expanding into lands warmed by temperate winds. But many centuries later, the hardy vikings of Norway began sailing into strange waters. They were born explorers who were ever on the lookout for new lands to colonize. Since they came from a northern country, their voyages took them through parts of the North Atlantic, and they must have traversed some of the seas beyond the Arctic Circle.

The viking colonization of Iceland about 870 A.D. was a first step toward the discovery of North America. A migratory group of Irish monks were already settled there! In the following century, Eric the Red made his way to Greenland. Then, his son, Leif, finally reached North America itself.

Other vikings went in different directions. Around the same time, a viking sea captain named Ottar sailed up the coast of Norway, rounded the tip of North Cape, and headed east. It was the first authenticated voyage in history into Arctic waters.

Near the end of the 15th century, the

Why were some nations suddenly interested in Polar exploration?

Italian navigator, Christopher Columbus, tried to reach the lands of the

Far East by sailing west around the globe, but he ran into the immovable barrier of the continents of North and South America. Once it was established that these continents were not Asia but other huge land masses, the leaders and businessmen of some European nations began to send expeditions in an attempt to discover a passage through, or around, them.

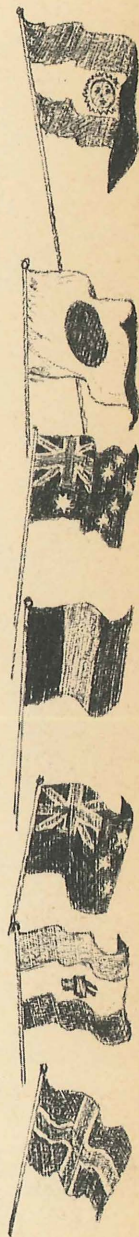
Explorers traveled the broad American rivers, hoping they would prove to be channels leading through the two continents. They probed up and down without success. The Americas, thousands of miles wide, stretch almost from Pole to Pole. It was a hopeless task.

Other men decided that the way to solve the problem was to somehow sail around the continents. Magellan discovered a route that went around the southern tip of South America, but it proved to be an extremely long and difficult trip. So, a search began for a northwest or northeast passage right over the top of the world.

In 1553, the British merchants sent out

How far did the first Polar voyagers get? three ships in an effort to reach the fa-

bled lands of the Orient. Trying to find a northeast passage, they sailed northward along the coast of Norway, following the path of Ottar the Viking, and then turned east. The captain of the fleet, Sir Hugh Willoughby, had great faith in a northeast passage, but the voyage ended in tragedy. Two ships, marooned on a northern Russian peninsula, were caught by the mighty winter; Willoughby and his men per-



ished. The third ship, however, found a Russian port in the White Sea and returned safely when the winter was over.

The man who began the drive for a northwest passage was another Englishman, Martin Frobisher. He made three westward expeditions, his first in 1576; the second, the following year; and the third in 1578. Each venture followed the coastline of Greenland down to its southern tip, then made a northwest traverse into a likely waterway. It proved, however, to be only a huge bay. This body of water, now known as Frobisher Bay, is just below the Arctic Circle and the farthest he went.

Frobisher's countryman, John Davis, followed this course in 1587, but he turned due north after rounding Greenland and sailed deep into the icy waters of Baffin Bay. Although this took him well above the Arctic Circle, Davis did not find a northwest passage. Instead, island after island blocked his path. However, Davis returned with a great deal of technical information about the Arctic; he was the first man to seriously study the Eskimos.

The English were followed by the Dutch. William Barents left the comfort of his home in 1596 and, for a third time, tried a northeast passage. He took the standard route around Norway and reached an icy sea which was named for him by later geographers. This voyage was his most successful; he attained a point some 600 miles from the Pole. Then, the

What was the next nation to try a Polar passage?

Arctic trapped him. Pack ice piled around his ship and began to crush it. Realizing that he and his crew would have to brave the Arctic winter, Barents led his men across the ice to the barren island of Novaya Zemlya. They built a house where they survived the winter. In spring, when the pack ice began to break, Barents decided to make an open boat voyage to the Kola Peninsula, the northwest tip of Arctic Russia. It was his last voyage. His crew survived the 1600-mile trip but Barents died of scurvy on the way.

The British, however, kept looking for the northwest passage; they were sure it existed. Henry Hudson made four such trips between 1607 and 1611. He never returned from the last. William Baffin, around 1615, went as far north as possible along the western side of Greenland. But nobody seemed to be able to find a way through the maze of islands and icebound seas, no matter what direction was taken.

Czar Peter The Great was also determined to find a passage. In 1724, he hired a Danish sea captain, Vitus Bering, to find a clear waterway. He was ordered to make a 5,000-mile overland trek, across northern Siberia, looping right around the Arctic Ocean on land. At the town of Okhotsk on the Pacific coast, he was to build ships and set sail.

Bering made the land journey safely, built his ships, and navigated around the Kamchatka Peninsula. Then, he turned north and discovered a narrow

What was Russia's contribution to early Polar exploration?

mined to find a passage. In 1724, he hired a Danish sea



waterway that separated the East from the West. Sailing into it, he saw the frozen Arctic Ocean reaching far to the north. A great discovery, the waterway is now known as Bering Strait. Yet Bering had not actually sailed over the top of North America. He repeated his voyage and, this time, sailed past the strait that bears his name to land on Alaska. Bering's voyages gave geographers much new knowledge about the North. They also obtained for Russia the vast, wealthy territory of Alaska. The United States purchased Alaska for a little over seven million dollars in 1867. Today, the strip of water that leads to the Arctic Ocean divides the lands of the two greatest nations in the world.

After Bering's epic achievements, many other expeditions began to explore the edges of the Arctic Circle, adding to the knowledge of the area with information about islands, ocean currents, and the movement of the pack

ice. The many men would make a very long list, but you can find most of them on a map of the Arctic. Islands, bays, seas, gulfs, and straits bear their immortal names.

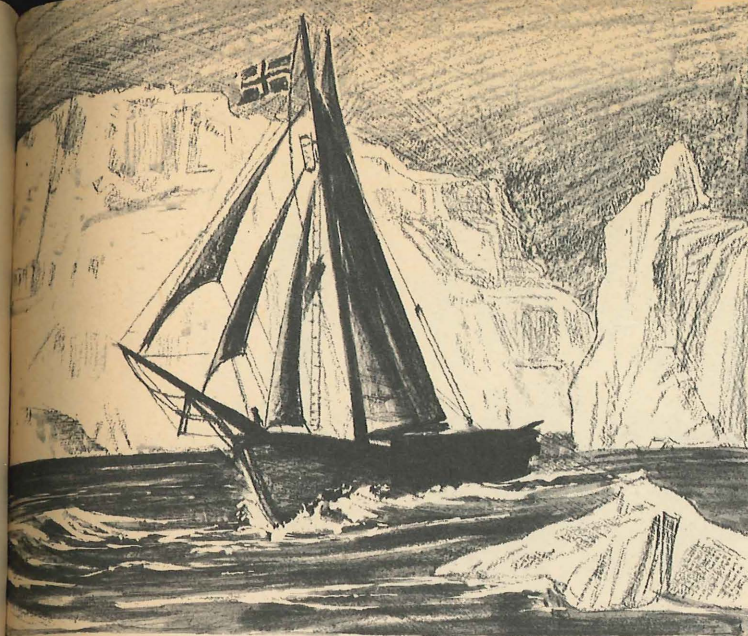
Year after year, expeditions moved closer and closer to the Pole. It gradually became the goal. A passage to the Far East was still being sought, but it became a point of pride to become the first man to stand on top of the world. It would also bring a wealth of prestige to that man's country.

One important place in the North does not bear the name of its discoverer. The North Magnetic Pole is no more than a geographic point, but it is the upper end of the giant magnet of the Earth. James Clark Ross, who, as a young man, had accompanied his uncle, Sir John Ross, on a voyage to the Arctic in 1818, was the first man to locate the place toward which our compass needles swing. It has, however, wan-

One of the most tragic and fateful expeditions in search of the Northwest Passage was led by Sir John Franklin, who commanded for the British Admiralty two new propeller-driven steamships in 1844, the *H.M.S. Terror* and the *Erebus*. In 1846, he sailed into the Victoria Channel and never again were Franklin or any of his 129 officers and men heard of. Their disappearance inadvertently led to the most extensive exploration of the Arctic. At least 40 expeditions were sent out to solve the mystery until, at last, in 1859, a search party under Captain McClintock found in a stone cairn on King William Island a paper that told of the death of Franklin and his men of scurvy, hunger, and exhaustion.



McCLINTOCK'S MEN FIND THE STONE CAIRN ON KING WILLIAM ISLAND



The *Gjøa* was just large enough to carry six men, but under Amundsen's command, she reached her goal — completion of the Northwest Passage.

dered much further north and west since that time; interestingly, the Magnetic Poles do not remain stationary.

At the end of the nineteenth century, the goal that had been sought for hundreds of years by scores of men was finally achieved. Two expeditions actually made a passage through the Arctic and reached the East!

Swedish scientist and explorer Nils A. E. Nordenskjöld sailed from Sweden in his ship, the *Vega*, in 1878. It was a warm July and he sailed northeast through a melting Arctic Ocean. Following the northern coasts of Russia and Siberia, the *Vega* came within 120 miles of the Bering Strait when winter struck. Although locked in the ice, the ship held together, and the men survived the blizzards and icy cold until the following spring thawed them out. Then, two days of clear sailing brought the expedition through the Strait and

out into the free waters of the Pacific Ocean! The Northeast Passage had at last been accomplished.

In 1903, a Norwegian, Roald Amundsen, took five other men aboard his tiny sailing ship, the *Gjøa*. He planned to skirt the top of North America and make a try for the Pole, as well. The explorers settled into their first winter in a cozy harbor at King William Island, and made out so well that they decided to stay for another winter. Based at this harbor, Amundsen added considerably to knowledge of the Arctic by making maps, taking soundings of the ocean, and studying the weather. By the summer of 1905, he set sail again, working his way to the West. Another winter was spent frozen-in above Canada, but during the following summer, he made his way through the Bering Strait. Another goal had been reached — the Northwest Passage!

Both journeys proved another point. Although it was possible to make the passage, it was not practical. Merchant ships would never be able to take advantage of the routes. The danger and the time consumed would make them commercially impossible.

Some time before Amundsen's voyage, another Norwegian, Fridtjof Nansen, had embarked on a bold venture. The drift of the pack ice had now been observed and charted for many years. Nansen decided that much could be learned by following that drift. He also hoped that the drift crossed the Pole itself. In 1893, he sailed his specially-designed ship, the *Fram*, into the Arctic, where he deliberately allowed the pack ice to trap him. He wanted the ice



The sturdy *Fram*, Nansen's ship, locked in Arctic ice to prove the Polar ice drift.

to carry him to the Pole. Month after month, the ice-locked ship drifted slowly to the North. Nansen watched his compass patiently, noted his observations, and hoped. It was a long, slow wait. By 1895, he realized that he wouldn't make the Pole.

Then, the spirit of adventure took over. Nansen and one member of his crew, Hjalmar Johansen, left their comrades, hitched dogs to a loaded sled, and left on skis for the North Pole. They had to give up, but they traveled farther north than anyone else had — within 300 miles of their goal. Winter descended again. The two men built a hut of stones and lived quietly. They ate blubber and warmed themselves with a whale oil lamp. In May of 1896, they started the weary trek to the South. Then, by one of the greatest coincidences in the history of exploration, they stumbled into the English expedition led by Frederick Jackson. Jackson took them home in August, 1896, and just a few days later, the *Fram* arrived in fine shape.

Although he did not reach the Pole, Nansen was still acclaimed as a hero. His theory of the Polar ice drift was confirmed, and he also brought back some knowledge of the depth of the Arctic Ocean near the Pole. Another step toward understanding the Arctic had been made.

Many men had tried it but Robert E. Peary, an American, was the first man to stand on top of the world. He had made a career of Arctic exploration, traveling through the barren northlands for more than twenty years. But he had set his sights

**Who finally
reached the Pole?**



on the North Pole. Nothing else would satisfy this determined man. Passages to the East did not interest him; science was secondary. He wanted to get to the Pole just because it was there, a seemingly unattainable place where no other man had been.

Peary was an organizer. He planned his final expedition like a military maneuver. He had studied the North for a long time and made a decision that, at first, seemed foolhardy. Peary decided to begin his attempt during the winter! He reasoned that travel would be easier since the ice was more stable and more uniformly coated with snow. Then, he divided his companions, Eskimo helpers, and dogs into teams. These teams were to be advance sup-

port parties so that the final group would be as fresh as possible. Shelters would be constructed along the way to make the return more comfortable, and food was to be cached at specific places. Mrs. Peary would come, too!

In July of 1908, he sailed for Ellesmere Island, a large island just west of Greenland and one of the northernmost land masses near the Pole. A camp was established on the northern tip of the island and the plans were modified. They then waited for winter. In February, an advance unit headed out into the unknown regions. On the next day, four other teams left. They were followed by Peary's group, composed of Matthew Henson, his Negro aide, four Eskimos, and the explorer himself.



Peary's party on its way to the Pole had to overcome ice barriers which at first appeared insurmountable.

The goal is reached at last! Peary and his men stand "on top of the world."

Slowly, the teams worked their way north, setting up advance camps and generally preparing the way.

On April 1st, their work was done and Peary's team was on its own. He began the last long push. Five days later, April 6, 1909, Peary stopped to make observations. He wanted to make sure he was at the exact location of the Pole. He wasn't. Three more miles of travel would do it. The weary party moved on. Suddenly, they were there! Peary took more observations. They read 90 degrees north! At this point, every direction was south. The team had made it! The top of the world. The Pole at last.

TO THE SOUTH

Three countries claim credit for discovery of the continent of Antarctica — The United States, England, and Russia.

It all began in the middle of the eighteenth century when the British sea captain, James Cook, left for the South Seas. He was sent to see if there was a continent at the southernmost end of the earth. English scientists wanted to prove, or disprove, an ancient belief that a huge land mass far to the south balanced the large northern continents.

When Cook, the first person to do so, crossed the Antarctic Circle, he was immediately surrounded by fog and pack ice. He could not sail another inch south. The experienced sailor backed off and tried another approach. Although he crossed the Circle at three

different points, he never got close enough to see the massive continent.

When James Cook returned to England, his reports indicated that further exploration beyond the Antarctic Circle was impossible. But his report told also of the many whales and seals in the southern oceans.

The whaling industry welcomed eagerly the opportunity of new waters to hunt in, and soon, whaling and sealing ships from many countries probed the area. Although profitable, not one ship came close to the icy continent hidden by the fogs. Around 1820, the ships of three countries arrived in the same area within days of each other. One was a British whaler; the second, an American sealer; and the third, a Russian exploratory expedition.

When the British whaler approached the continent, a William Smith actually sighted its icy cliffs. Nathaniel Palmer, captain of the American sealer, saw the long, narrow peninsula which now bears his name. Fabian von Bellingshausen, the commander of the Russian expedition, actually sailed all the way around the continent, discovering bays, off-shore islands, and mapping the coastline on the way.

But no one knows which of the three men saw Antarctica first.

Once Antarctica was on the map, explorers streamed into the Pacific to find out what they could about this new land.

In 1823, James Weddell, a British navigator, sailed into the sea that now bears his name and reached a new



The *Endurance*, Shackleton's ship, abandoned by her crew, unable to withstand the pressure of the ice, sinks slowly into the frozen Weddell Sea.

farthest south. The French Government sent Dumont d'Urville in 1838, and again in 1840. He named a stretch of the Antarctic coastline after his wife, Adélie. At about the same time, a group from the United States headed by Lt. Charles Wilkes, USN, reported land and skirted the coast westward for 1500 miles. This was a tragic voyage that suffered the illness of many men and the desertion of many others. Wilkes was first to establish existence of an Antarctic continent.

In 1841, the British sent Sir James Clark Ross of Arctic fame. Ross spent three years sailing the coastline and mapping the shape of the continent. He discovered the Ross Sea, the Ross Ice Shelf, Victoria Land, and two mountains, Erebus and Terror. Mount Erebus turned out to be a smoking active volcano in the midst of the ice!

Due to these explorations from several countries, Antarctica is today cut up like a pie, with pieces claimed by Norway, Great Britain, Australia, France, Chile, New Zealand, Argen-

tina, Russia, and the United States. The varied nationality of Antarctica is reflected in its place names that stem from many languages.

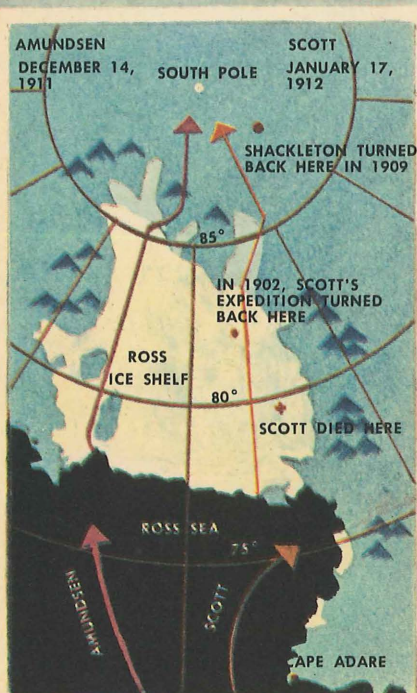
There was a veritable race to the Pole.

Who was the first to reach the South Pole? It had become a point of pride. Since

Peary of the United States had triumphed in the North, the British and the Norwegian hotly contested each other in a competition for the South Pole.

The British Royal Navy assigned Sir Robert Falcon Scott to lead an expedition, and in 1902, he began his first trek over the ice-covered land. After fifty-nine days, when he was still about 400 nautical miles from the Pole, Scott turned back, defeated.

One of the men with Scott on that trip was rugged Sir Ernest Shackleton. A determined explorer, he returned in 1909 with his own expedition. Advance parties were sent out to set markers and prepare food caches for the actual ex-



Scott's party finds Amundsen's tent and flag at the Pole (above right).
The map (above left) shows the routes Amundsen and Scott took for their "race" to the Pole.

ploratory team. The weather was cruel. Blizzards swirled continuously and the temperature dropped, but Shackleton pushed on. He had to keep on schedule, or there would not be enough food for the return journey. Shackleton and his men came within ninety-seven nautical miles of the Pole, but they dared go no farther. They raced back, dreading

starvation, and just made it. The 1700-mile march was an epic feat of endurance that taught men much about the problems of Antarctic exploration.

So, the man who first reached the Pole was that veteran of the Arctic, Norwegian Roald Amundsen. He had been planning to try for the North Pole when news of Peary's triumph echoed



While Amundsen used teams of huskies to sledge to the Pole, Scott started out with Siberian ponies which could not stand the cold and died quickly. Pulling the sledges themselves for the last 350 miles exhausted the energies of Scott and his men.



The rescue party that found Scott's body, photographs, and papers erected the cairn and cross to mark his grave in Antarctica.

around the world. Amundsen did not hesitate. One Pole had been conquered, but the other still beckoned.

Amundsen had planned his assault very carefully, equipping himself with sleds, skis and, most important, fifty-two Eskimo Huskies. The dash to the Pole began in October, 1911. It went smoothly. The dogs made the trip less strenuous; the men could ride the sleds or be pulled along on their skis. Day after day, the expedition moved south and, on December 14, 1911, Roald Amundsen made some careful observations and calmly told his men that they

were standing at 90 degrees south — the bottom of the world! From this point, all directions led north. The South Pole had finally been reached!

Robert Falcon Scott returned to Ant-

What tragedies arctica in Jan-
followed the discovery uary, 1911,
of the South Pole? for a second

try at the Pole. He made lengthy preparations, but his men were beset by sickness, and he had to delay the attempt several times. Then, he got a message from Amundsen announcing the Norwegian attempt. Scott knew he could wait no longer. The race was on!

Scott started for the Pole a few weeks after Amundsen. Both base camps were on the Ross Sea, but at opposite ends.

Scott could not move as quickly as Amundsen. He did not believe in the value of sled dogs but depended on Siberian ponies to pull his supplies the first half of the way, and intended to use manpower for the last half. Scott reasoned that the will power of men would prevail; animals might quit under pressure. But Amundsen, with all his Arctic experience, knew that the only way to reach the Pole was with the Husky.

Scott's expedition was plagued by bad luck from the very beginning. When his supporting party returned to the base camp in discouragement, he and four companions pushed ahead doggedly. They plodded on, growing more weary each day from the strain of pulling their own sleds. Twenty miles from the Pole, they found sled tracks and the marks of dogs' paws in the snow. They pushed excitedly ahead. A shocking discovery awaited them in the ice — Roald Amundsen's tent with the wind-tattered flag of Norway streaming over it. Inside the tent, Scott found a note

from Amundsen asking that the finder notify his king and make use of the tent, any of the articles in it, and the sledge outside. A dejected Scott decided to turn back.

Scott kept a daily diary of this trip, and its final chapters are tragic. The return march was like a nightmare. Food supplies ran low, blizzards impeded their progress, and sickness weakened them. On February 17, one man died and was buried in the snow. In the next few weeks, the food all but ran out, and a second man heroically walked out of the tent to his death in the raging blizzard to leave enough food for the others.

By March 21st, the three remaining men could not move another step. They remained in their tent, barely alive. The final entry in Scott's diary was made on March 29, 1912. Death must have followed soon after.

A search party sent out by the British found the tent and the bodies of the brave captain and his two men on November 12, 1912. The diary gave all the sad details of the ill-fated expedition. The discovery of the South Pole had brought tragedy, as well as triumph.

Today and Tomorrow

The discovery of the Poles did not end Arctic and Antarctic exploration and research. Men continued to penetrate both icy zones, some for the sake of the challenge; others to collect scientific knowledge. Expeditions from many countries went north and south, testing new equipment and developing new techniques.

Admiral Richard E. Byrd of the United States Navy
What were Admiral Byrd's contributions to Polar research? made seven Polar trips in his long career, two to the North and five to the South. In 1926, he and his pilot, Floyd Bennett, took off from Spitsbergen, an Arctic island belonging to Norway, flew to the North Pole, circled

it several times, and flew back without incident. It was the first flight to the North Pole, and in 1926, the early days of aviation, this was a great feat. More important, it foreshadowed the day man would be using all his ingenuity and skills for Polar research.

Admiral Byrd turned his attention to Antarctica in 1928. He established a base camp named "Little America," brought his airplane, tons of supplies, and settled there to live and work with his crew for years. From the air, he photographed and mapped thousands of miles of terrain, and his teams of scientists gathered invaluable data about the Antarctic area. Byrd's work in the nineteen-thirties was the prelude to the intense activity that began there after World War II.

Immediately after World War II, many

What was the IGY? nations established research projects in both the Arctic and the Antarctic. This activity culminated in the International Geophysical Year, which began in 1957. It transformed the world's largest unexplored land mass

into a high-pressure laboratory. Twelve nations set up bases in Antarctica alone.

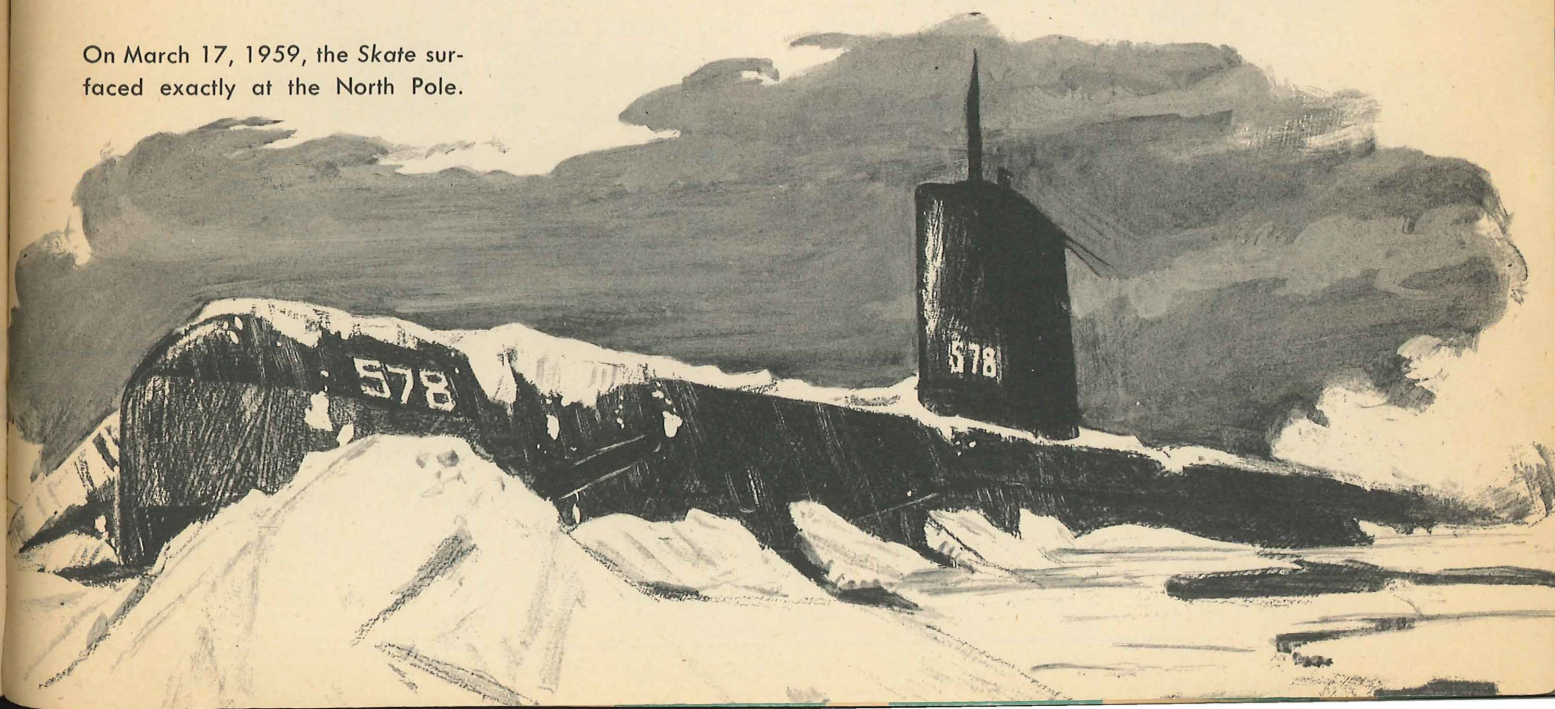
During the IGY period, two exploits made world headlines. A British expedition led by Sir Vivian Fuchs and Sir Edmund Hillary crossed Antarctica completely, passing through the Pole on the way. It took ninety-five days and covered 2,158 miles.

Of course, this team did not struggle across Antarctica with dog sleds. They used the latest means of Polar transportation, motorized vehicles with heated cabs that ride on broad tractor treads that equip them to cross ice crevasses and climb slippery slopes. Even with this modern equipment, there were some dangerous incidents. But the entire crossing has been hailed as a remarkable feat of modern exploration.

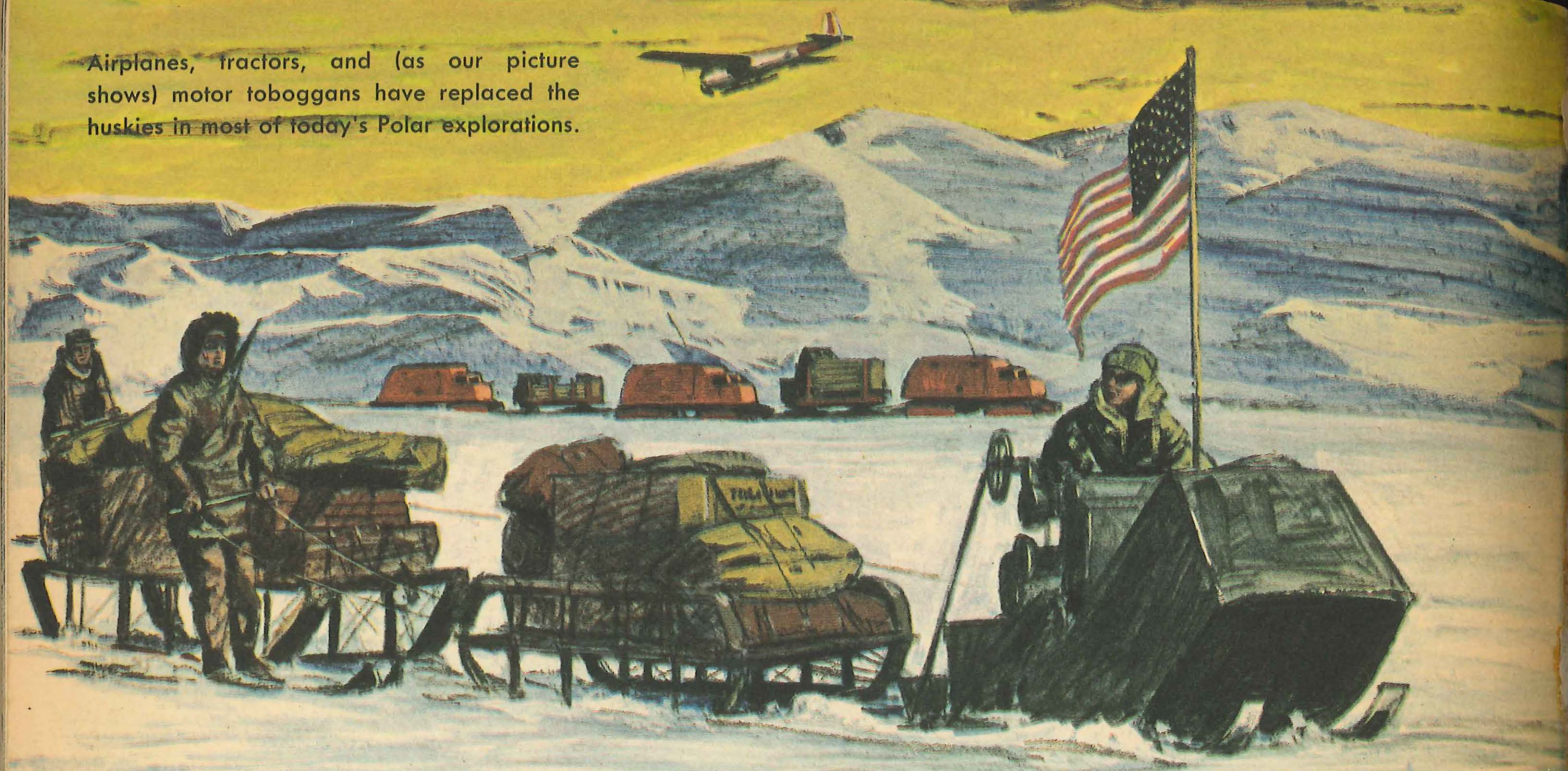
Far to the north — in fact, as far as anyone can get — the American submarine, *Nautilus*, sailed under the ice of the Arctic Ocean and, on August 3, 1958, passed under the Pole. A new type of Polar passage, it foreshadows the day when cargo submarines will follow a trade route at the top of the world.

On March 17, 1959, the submarine

On March 17, 1959, the *Skate* surfaced exactly at the North Pole.



Airplanes, tractors, and (as our picture shows) motor toboggans have replaced the huskies in most of today's Polar explorations.



Skate, far surpassed the *Nautilus*. Working carefully under the Arctic Ocean, she positioned herself exactly at the North Pole. Then, she floated up, broke through the ice, and became the first ship to reach the Pole. In so doing, the *Skate* and her crew fulfilled the dream of Fridtjof Nansen — to arrive at the Pole by ship.

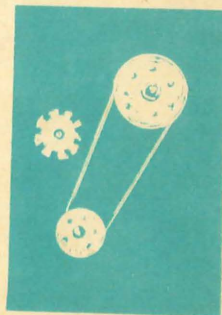
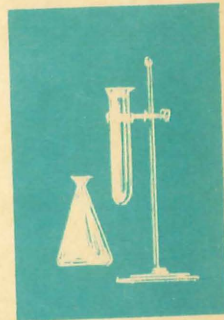
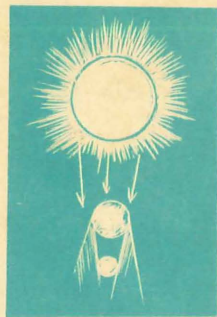
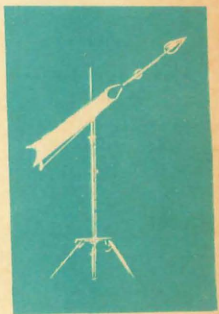
Research is going on in both Polar Regions. Permanent establishments are now the rule, with scientists coming and going regularly. Antarctica now boasts an atomic power station; helicopters soar above the icy wastes; and all kinds of powered equipment carries men across the snow.

We are learning a great deal. We now know much more about the magnetic field of our planet and the nature of the cosmic rays which arrive in its atmosphere from the far distant galaxies.

The glittering Auroras are being studied intensively. Weather plotting is becoming more exact. With a look to the future, especially space exploration, Soviet scientists on the Pamirs Plateau in Siberia, where the air is constantly cold and rarified, are studying plant and animal life. These conditions match closely what is presumed to be the "Martian environment."

American scientists at both Poles are accumulating a wealth of data about our planet and its relation to the other bodies of the solar system. All the countries involved are exploring busily the possibilities of extracting the mineral resources of Antarctica. We are also gathering information that may lead some day to man's endurance of a new ice age.

While the satellites move mysteriously through the dark enigma of space, the secrets of the once remote and forbidding ends of earth are steadily being exposed to the light of science.





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